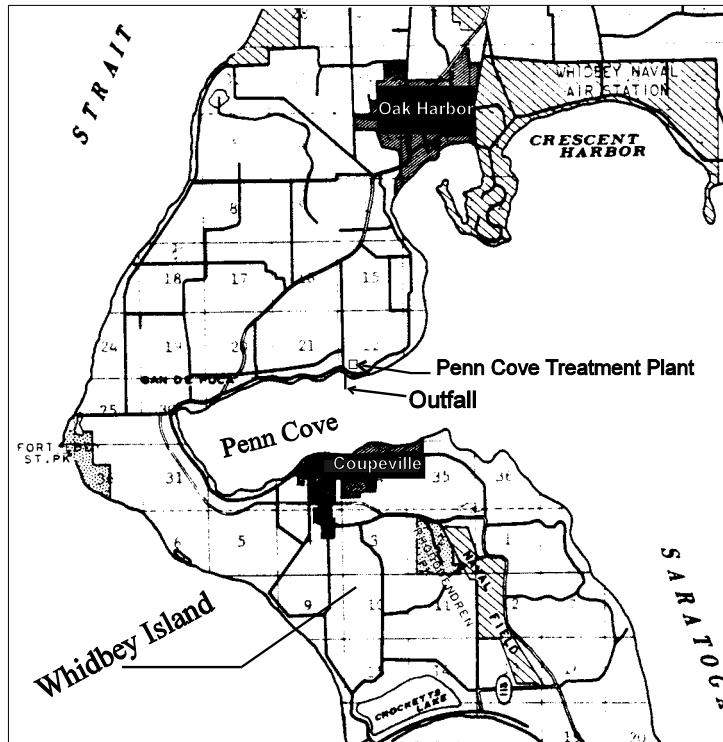


# FACT SHEET FOR NPDES PERMIT WA-002938-6

## PENN COVE WASTEWATER TREATMENT PLANT



This fact sheet is a companion document to the draft National Pollutant Discharge Elimination System (NPDES) Permit for the Penn Cove Wastewater Treatment Plant (WWTP). The fact sheet explains the nature of the proposed discharge, the Department of Ecology's (the Department's) decisions on limiting the pollutants in the wastewater, and the regulatory and technical basis for those decisions. The fact sheet and draft permit are available for review (see Appendix A--Public Involvement for more detail on the Public Notice procedures).

GENERAL INFORMATION		
<b>Applicant</b>	Penn Cove Water and Sewer District P.O. Box 954 Oak Harbor, WA 98277	
<b>Facility Name and Address</b>	Penn Cove Wastewater Treatment Plant 519 Scenic Heights Oak Harbor, WA 98277	
<b>Responsible Official</b>	Dean Thiem, District Manager	Phone (360) 679-4908
<b>Type of Treatment</b>	Oxidation Ditch (Activated Sludge - Secondary Treatment)	
<b>Discharge Location</b>	Penn Cove, Class A Marine Latitude: 48° 14' 14" N	Water Body ID No.: WA-06-0020 Longitude: 122° 40' 44" W
<b>Plant Contact</b>	Dave Dlugosh, Operator	Phone (360) 679-4908

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## INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System of permits (NPDES permits), which is administered by the Environmental Protection Agency (EPA). The EPA has authorized the State of Washington to administer the NPDES permit program. Chapter 90.48 RCW defines the Department of Ecology's authority and obligations in administering the wastewater discharge permit program.

The regulations adopted by the State include procedures for issuing permits (Chapter 173-220 WAC), technical criteria for discharges from municipal wastewater treatment facilities (Chapter 173-221 WAC), water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that a permit be issued before discharge of wastewater to waters of the state is allowed. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-220-060) for issuing a permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the availability of the draft permit is required at least thirty days before the permit is issued (WAC 173-220-050). The fact sheet and draft permit are available for review (see *Appendix A--Public Involvement* of the fact sheet for more detail on the Public Notice procedures).

The fact sheet and draft permit have been reviewed by the Permittee. Errors and omissions identified in this review have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. The fact sheet will not be revised. Comments and the resultant changes to the permit will be summarized in *Appendix D--Response to Comments*.

## BACKGROUND INFORMATION

### *DESCRIPTION OF THE FACILITY*

Penn Cove Water and Sewer District is located on Whidbey Island in Island County and serves about 450 people in 176 residences; there are no industrial users. Treatment consists of an influent grinder, coarse screening, grit removal in a gravity grit chamber, secondary treatment in an aerated oxidation ditch, clarification in two secondary clarifiers, chlorinated disinfection, and dechlorination prior to discharge to Penn Cove via a submerged 10-inch outfall line. Penn Cove is a class A marine waterbody.

### HISTORY

Most of the Penn Cove sewer collection system was built in 1962. The Penn Cove Water and Sewer District was upgraded to secondary treatment in September of 1993.

## TREATMENT PROCESSES

The facility is an oxidation ditch, extended aeration activated sludge process. The treatment process consists of an influent grinder with a manually cleaned bar screen bypass channel, grit removal in a gravity grit chamber, flow measurement in 3-inch Parshall flume, influent pumping by two submersible pumps, secondary treatment in the oxidation ditch, clarification in two secondary clarifiers, disinfection with chlorine in a chlorine contact chamber, and dechlorination. A plant layout diagram is shown in Appendix E.

Waste activated sludge and scum are removed in the clarifiers and directed to an aerobic digester where the solids are further stabilized. Digested sludge is removed from the aerobic digester on an as-needed basis, and taken to the Island County septage treatment facility near Coupeville where it is treated further then land applied to agricultural land.

The capacity of the facility at the writing of this fact sheet is 60,000 gpd. However, additional capacity is being sought. It has been proposed by Penn Cove Water and Sewer District that the design capacity of the facility can be increased to a maximum month flow of 100,000 gpd with the upgrade of aeration and digester blower capacities and RAS pumping capacity. If the requirements outlined in the Engineering Report prepared by Penhallegon Associates, dated October 2004, and approved by Ecology January 24, 2005, are met, and if the facility continues to demonstrate that the larger flows can be adequately treated to meet water quality standards, then the facility will be re-rated with an average monthly design capacity of 100,000 gpd.

## COLLECTION SYSTEM STATUS

Most of the Penn Cove sewer collection system was built in 1962. Engineering studies in the early 1990's documented a substantial amount of infiltration and inflow (I/I) in the system. The District has been evaluating I/I in their system for the past ten years as conditions of their previous discharge permits, and they have been making efforts to find and correct sources of extraneous water. The flow data in Appendix F shows that these efforts appear to be successfully reducing I/I in the system. Currently, average monthly flows reaching the treatment plant during the dry summer months are in the 15,000 - 20,000 gpd range. In the recent past, extended rainy periods during mid-winter months would sometimes drive average monthly flows over 60,000 gpd, the design flow of the plant. This has not happened since January 1997, and average monthly flows have more recently ranged between 22,000 and 38,000 gpd in the winter months. It is unclear at this point if this reduction in flows is due to decreases in I/I, or a result of conservation efforts and drier than usual weather.

It is important that the District continue to aggressively search for and eliminate sources of I/I in their collection system. It is proposed that the condition requiring the District to submit an annual report documenting the efforts they have made to locate and eliminate I/I in the collection system continue for the next permit term.

## DISCHARGE OUTFALL

Secondary treated and disinfected effluent is discharged from the facility through a 10-inch, 865-foot long corrugated steel outfall, which discharges at a depth of -50 feet MLLW into Penn Cove, directly south of the treatment plant. The pipe is open-ended, without any special diffuser ports. Penn Cove Water and Sewer District has performed an outfall diffuser study that identified

a three-port diffuser design that provides adequate mixing under all flow regimes. The new diffuser will have three 3-inch ports spaced 15 feet apart along the outfall line. The ports will be angled 60° from the horizontal, and will point in alternating east/west directions. This new diffuser shall be installed no later than October 1, 2006, as mandated by the compliance schedule in the accompanying permit.

#### RESIDUAL SOLIDS

The treatment facility removes solids during the treatment of the wastewater at the headworks (grit and screenings), and at the secondary clarifiers, in addition to incidental solids (rags, scum, and other debris) removed as part of the routine maintenance of the equipment. Grit, rags, scum and screenings are drained and disposed of as solid waste at the local landfill. Solids removed from the secondary clarifiers are treated in an aerobic digester and transferred to the Island County septage facility for further treatment and disposal.

#### PERMIT STATUS

The previous permit for this facility was issued on March 7, 2000, and became effective on April 1, 2000. The previous permit placed effluent limitations on 5-day biochemical oxygen demand (BOD<sub>5</sub>), total suspended solids (TSS), pH, fecal coliform bacteria, and total residual chlorine.

An application for permit renewal was submitted to the Department on December 18, 2003 and accepted by the Department on January 9, 2004.

#### SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

The facility received its last inspection on January 23, 2004. This was a class I compliance inspection without sampling. For the duration of the previous permit, the Permittee has maintained an excellent compliance record with no permit exceedances.

#### WASTEWATER CHARACTERIZATION

The concentration of pollutants in the discharge was reported in the NPDES application and in discharge monitoring (DMR) reports. A full summary of the DMR reports for the past five years is found in Appendix F. The effluent is characterized in Table 1, based on DMR data since April 2000.

### PROPOSED PERMIT LIMITATIONS

Federal and State regulations require that effluent limitations set forth in a NPDES permit must be either technology- or water quality-based. Technology-based limitations for municipal discharges are set by regulation (40 CFR 133, and Chapters 173-220 and 173-221 WAC). Water quality-based limitations are based upon compliance with the Surface Water Quality Standards (Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC), Sediment Quality Standards (Chapter 173-204 WAC) or the National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992.) The most stringent of these types of limits must be

chosen for each of the parameters of concern. Each of these types of limits is described in more detail below.

**Table 1. Wastewater Effluent Characterization - Average values for April 2000 - November 2003**

Parameter	Concentration
BOD	
Monthly Average, mg/L	5
Monthly Average, ppd	1
Month. Avg. % Reduction	97
Weekly Average, mg/L	6
Weekly Average, ppd	1
TSS	
Monthly Average, mg/L	9
Monthly Average, ppd	1.4
Month. Avg. % Reduction	95
Weekly Average, mg/L	11
Weekly Average, ppd	2.1
Total Chlorine	
Monthly Average, mg/L	0.29
Avg. of daily max, mg/L	0.59
pH	
Average of month. min.	7.2 std. units
Average of month. max.	7.5 std. units
Fecal Coliform	
Average of month. avg.	12 /100 ml
Average of weekly avg.	40 /100 ml
Flow	
Month Average, MGD	0.021
Avg. of month max, MGD	0.035

The limits in this permit are based in part on information received in the application. The effluent constituents in the application were evaluated on a technology- and water quality-basis. The limits necessary to meet the rules and regulations of the State of Washington were determined and included in this permit. Ecology does not develop effluent limits for all pollutants that may be reported on the application as present in the effluent. Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation. Effluent limits are not always developed for pollutants that may be in the discharge but not reported as present in the application. In those circumstances the permit does not authorize discharge of the non-reported pollutants. Effluent discharge conditions may change from the conditions reported in the permit application. If significant changes occur in any constituent, as described in 40 CFR 122.42(a), the Permittee is required to notify the Department of Ecology. The Permittee may be in violation of the permit until the permit is modified to reflect additional discharge of pollutants.

### DESIGN CRITERIA

In accordance with WAC 173-220-150 (1)(g), flows or waste loadings shall not exceed approved design criteria. The design criteria for this treatment facility are taken from the approved 1992 design plans prepared for the District by Gray & Osborne Consulting Engineers, and are as shown in Table 2.

**Table 2. Design Standards for the Penn Cove Water and Sewer District WWTP**

Parameter	Design Quantity
Monthly average flow (max. month)	60,000 gallons/day
Peak day design flow	100,000 gallons/day
Peak instantaneous flow	300,000 gallons/day
BOD <sub>5</sub> influent loading	88 lbs./day
TSS influent loading	97 lbs./day

However, Penn Cove Water and Sewer District has requested a facility capacity re-rate from the current design average monthly flow of 60,000 gpd to 100,000 gpd. An engineering report has been submitted to Ecology that demonstrates the facility can adequately treat average monthly flows of 100,000 gpd if additional aeration and digester blower capacities and RAS pumping capacity are added. If the requirements outlined in the Engineering Report prepared by Penhallegon Associates, dated October 2004, and approved by Ecology January 24, 2005, are met, and if the facility continues to demonstrate that the larger flows can be adequately treated to meet water quality standards, then the facility will be re-rated with an average monthly design capacity of 100,000 gpd. The re-rate shall be considered in place when the consultant has signed and submitted to the Department a construction completion form, and the Department has accepted this form with an acceptance letter to the permittee. After the re-rate, flows or waste loadings of the following design criteria for the permitted treatment facility shall not be exceeded:

Average flow for the maximum month:	100,000 GPD
BOD <sub>5</sub> loading for maximum month:	147 lb/day
TSS loading for maximum month:	162 lb/day

### *TECHNOLOGY-BASED EFFLUENT LIMITATIONS*

Municipal wastewater treatment plants are a category of discharger for which technology-based effluent limits have been promulgated by federal and state regulations. These effluent limitations are given in the Code of Federal Regulations (CFR) 40 CFR Part 133 (federal) and in Chapter 173-221 WAC (state). These regulations are performance standards that constitute all known available and reasonable methods of prevention, control, and treatment for municipal wastewater.

The technology-based mass limits shown in Table 3 are based on WAC 173-220-130(3)(b) and 173-221-030(11)(b).

The monthly effluent mass loading (lb/day) is determined from the following calculation:

$$\text{Mass limit (lb/day)} = \text{the maximum monthly design flow (MGD)} \times \text{Conc. limit (mg/L)} \\ \times 8.34 \quad (8.34 \text{ is a conversion factor})$$

The weekly average effluent mass loading is calculated as:

$$1.5 \times \text{monthly loading (15 lbs/day)} = 22.5 \text{ lbs/day.}$$



**Table 3. Technology-based Limits**

Parameter	Limit
pH:	shall be within the range of 6 to 9 standard units.
Fecal Coliform Bacteria	Monthly Geometric Mean = 200 organisms/100 mL Weekly Geometric Mean = 400 organisms/100 mL
BOD <sub>5</sub> (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 45 mg/L
TSS (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 45 mg/L
BOD <sub>5</sub> (mass)	Ave. Monthly Limit = 15 lb/day Ave. Weekly Limit = 22.5 lb/day
TSS (mass)	Ave. Monthly Limit = 15 lb/day Ave. Weekly Limit = 22.5 lb/day
Chlorine Residual <sup>1</sup> (concentration)	Ave. Monthly Limit = 0.34 mg/L Max. Daily Limit = 0.51 mg/L
Chlorine Residual <sup>1</sup> (mass)	Ave. Monthly Limit = 0.17 ppd

<sup>1</sup> The existing permit has a monthly average chlorine limit of 0.34 mg/L and the facility is able to comply with it. The proposed permit includes the same limit.

The effluent mass limits will increase when the facility has been upgraded to 100,000 gpd (see the *Design Criteria* section for details). Since the facility is not expected to reach these larger flows during the life of this permit, the new effluent mass limits will not be applied until the next permit cycle. In addition, the chlorine concentration and mass effluent limits will increase with the increased dilution of the new diffuser (see the *Mixing Zones* section for details). However this increase is small (see Appendix G), and in order to prevent back-sliding the existing chlorine limits will stay in effect. The facility has demonstrated that the existing chlorine limits can be reliably attained since the installation of the dechlorination system.

### *SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS*

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Surface Water Quality Standards. The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the surface waters of the state. Water quality-based effluent limitations may be based on an individual waste load allocation (WLA) or on a WLA developed during a basin-wide total maximum daily loading study (TMDL).

## NUMERICAL CRITERIA FOR THE PROTECTION OF AQUATIC LIFE

"Numerical" water quality criteria are numerical values set forth in the State of Washington's Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria set forth in the Water Quality Standards are used along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

## NUMERICAL CRITERIA FOR THE PROTECTION OF HUMAN HEALTH

The state was issued 91 numeric water quality criteria for the protection of human health by the U.S. EPA (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters.

## NARRATIVE CRITERIA

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the State of Washington.

## ANTIDEGRADATION

The State of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when receiving waters are of higher quality than the criteria assigned, the existing water quality shall be protected. More information on the State Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

The Department has reviewed existing records and is unable to determine if ambient water quality is either higher or lower than the designated classification criteria given in Chapter 173-201A WAC; therefore, the Department will use the designated classification criteria for this water body in the proposed permit. The discharges authorized by this proposed permit should not cause a loss of beneficial uses.

## CRITICAL CONDITIONS

Surface water quality-based limits are derived for the waterbody's critical condition, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water body uses.

## MIXING ZONES

The Water Quality Standards allow the Department of Ecology to authorize mixing zones around a point of discharge in establishing surface water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants that can have a toxic effect on the aquatic environment near the point of discharge. The concentration of pollutants at the boundary of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving all known, available, and reasonable methods of prevention, control and treatment (AKART) and in accordance with other mixing zone requirements of WAC 173-201A-100.

The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria.

Pollutant concentrations in the proposed discharge exceed water quality criteria with technology-based controls which the Department has determined to be AKART. A mixing zone is authorized in accordance with the geometric configuration, flow restriction, and other restrictions for mixing zones in Chapter 173-201A WAC.

In November 1995, Beak Consultants, under contract with the District and R.W. Beck Consultants, published an exhaustive analysis of the existing, single port, Penn Cove outfall, to determine the dilution characteristics. More than sixty computer runs were conducted to determine the discharge conditions, and the "worst-case" acute and chronic dilution ratios were determined. Replicas of the selected worst-case computer model runs are shown in Appendix C.

In accordance with state mixing zone criteria, the acute dilution was determined at a distance (radius) of 25 feet (7.62 m) from the pipe, and the chronic dilution was determined at 250 feet (76.2 m). The Beak conclusions were that the acute, or "zone of acute criteria exceedance", dilution ratio is 74:1, and the chronic, or "mixing zone", dilution ratio is 771:1. However, the chronic dilution zone occurs far enough from the pipe that edge effects from the shoreline become important, so the "constant eddy" model must be used, rather than the "4/3 Power Law" model selected by Beak. This reduces the calculated chronic dilution ratio to 258:1. Both models are shown in the Beak model run of appendix C.

The accepted dilution ratios for the existing, single port, Penn Cove outfall are:

Acute dilution ratio	74:1
Chronic dilution ratio	258:1

A diagram of the Penn Cove mixing zone is shown in Figure 1.

The open pipe outfall described does not provide adequate mixing under all flow conditions of the Penn Cove wastewater treatment facility. Penn Cove Water and Sewer District has performed an outfall diffuser study and has identified a three-port diffuser design that will provide adequate mixing under all flow regimes. This new diffuser shall be installed no later than October 1, 2006.

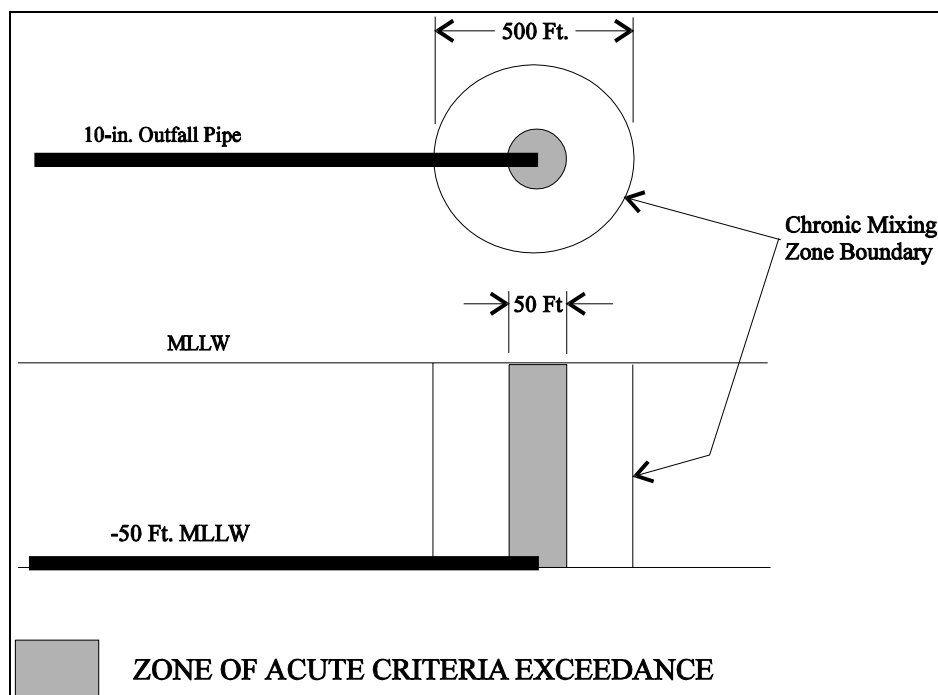


Figure 1. Outfall Mixing Zone

Modeling of the new three port diffuser shows that adequate mixing is attained for flows ranging from 20,000 to 300,000 gpd. The biggest influence on mixing performance was found to be density stratification in the receiving water. This density stratification is influenced mostly by temperature and salinity. Using data from Ecology's database of long-term marine water quality data, the most stratified conditions were determined and used in the modeling runs since this gives the most conservative results. Modeling results, shown in Appendix C, show that the new diffuser will have the following dilution ratios:

Acute dilution ratio	84:1
Chronic dilution ratio	426:1

Since the new 3-port diffuser will provide better mixing, the mixing zone dilution factors will increase. For this permit, the only effluent limit influenced by dilution factors is chlorine, and calculations show that impact is small (see Appendix G). For this reason, and to avoid backsliding, the chlorine limits will remain as calculated for a single port diffuser. The facility has demonstrated that these limits can be reliably attained since the installation of the dechlorination system.

#### DESCRIPTION OF THE RECEIVING WATER

The facility discharges to Penn Cove which is designated as a Class A Marine receiving water in the vicinity of the outfall. Other nearby point source outfalls include the Town of Coupeville, almost directly across Penn Cove to the south. Significant nearby non-point sources of pollutants include stormwater runoff from agricultural lands. Characteristic uses include the following:

Water supply (domestic, industrial, agricultural); stock watering; fish migration; fish and shellfish rearing, spawning and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation.

Water quality of this class shall meet or exceed the requirements for all or substantially all uses.

#### SURFACE WATER QUALITY CRITERIA

Applicable criteria are defined in Chapter 173-201A WAC for aquatic biota. In addition, U.S. EPA has promulgated human health criteria for toxic pollutants (EPA 1992). Criteria for this discharge are summarized in Table 4.

**Table 4. Water Quality Criteria for Class A Marine Waters**

Parameter	Class A WQ Criteria
Fecal Coliforms	14 organisms/100 mL maximum geometric mean
Dissolved Oxygen	6 mg/L minimum
Temperature	16 degrees Celsius maximum or incremental increases above background
pH	7.0 to 8.5 standard units
Turbidity	Turbidity shall not exceed 5 NTU over background turbidity when the background is 50 NTU or less, or have more than a 10% increase when background turbidity is above 50 NTU
Toxics	No toxics in toxic amounts (see Appendix C for numeric criteria for toxics of concern for this discharge)

#### CONSIDERATION OF SURFACE WATER QUALITY-BASED LIMITS FOR NUMERIC CRITERIA

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, are near-field pollutants--their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as BOD is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

The derivation of water quality-based limits also takes into account the variability of the pollutant concentrations in both the effluent and the receiving water.

BOD<sub>5</sub>--This discharge with technology-based limitations results in a small amount of BOD loading relative to the large amount of dilution occurring in the receiving water at critical conditions. The effluent plume reaches the boundary of the chronic dilution zone within about 48 minutes. Very little of the permitted 30 mg/L BOD will exert in such a short time. This, plus the 258:1 dilution, will result in an expected oxygen drop of less than 0.1 mg/L in the adjacent

receiving waters. Thus, technology-based limitations will be protective of dissolved oxygen criteria in the receiving water.

Temperature--The Permittee reports an influent temperature of 64°F during the summer months (effluent temperature not monitored). Assuming a similar effluent temperature, a receiving water temperature of 61°F, and a dilution of 258:1, it is estimated that the discharge will cause a temperature increase of 0.01°F at the chronic dilution boundary. Thus, there is no predicted violation of the Water Quality Standards for Surface Waters. Therefore, no effluent limitation for temperature was placed in the proposed permit.

pH--Because of the high buffering capacity of marine water, compliance with the technology-based limits of 6 to 9 will assure compliance with the Water Quality Standards for Surface Waters.

Fecal coliform--The numbers of fecal coliform were modeled by simple mixing analysis using the technology-based limit of 400 organisms per 100 ml and a dilution factor of 258:1. Under critical conditions, this should result in an increase of no more than 2 organisms/100 mL at the boundary of the chronic dilution zone. Since there is no predicted violation of the Water Quality Standards for Surface Waters with the technology-based limit, the technology-based effluent limitation for fecal coliform bacteria was placed in the proposed permit.

Toxic Pollutants--Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. This process occurs concurrently with the derivation of technology-based effluent limits. Facilities with technology-based effluent limits defined in regulation are not exempted from meeting the Water Quality Standards for Surface Waters or from having surface water quality-based effluent limits.

Chlorine was the only toxic determined to be present in the discharge. The existing permit has an interim monthly average chlorine limit of 1.0 mg/L, and a final monthly average limit of 0.34 mg/L. Since the issuance of the existing permit, Penn Cove has installed a dechlorination system and the facility has since demonstrated the ability to meet the final limits. The proposed permit includes the same chlorine limits as the final limits in the existing permit.

#### WHOLE EFFLUENT TOXICITY

The Water Quality Standards for Surface Waters require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing.

Toxicity caused by unidentified pollutants is not expected in the effluent from this discharge as determined by the screening criteria given in Chapter 173-205 WAC. Therefore, no whole effluent toxicity testing is required in this permit. The Department may require effluent toxicity testing in the future if it receives information that toxicity may be present in this effluent.

## HUMAN HEALTH

Washington's water quality standards now include 91 numeric health-based criteria that must be considered in NPDES permits. These criteria were promulgated for the state by the U.S. EPA in its National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992).

The Department has determined that the applicant's discharge is (1) unlikely to contain chemicals regulated for human health, and (2) does not contain chemicals of concern based on existing data or knowledge. The discharge will be re-evaluated for impacts to human health at the next permit reissuance.

## SEDIMENT QUALITY

The Department has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that the Department may require Permittees to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400).

The Department has determined through a review of the discharger characteristics and effluent characteristics that this discharge has no reasonable potential to violate the Sediment Management Standards.

## *GROUND WATER QUALITY LIMITATIONS*

The Department has promulgated Ground Water Quality Standards (Chapter 173-200 WAC) to protect uses of ground water. Permits issued by the Department shall be conditioned in such a manner so as not to allow violations of those standards (WAC 173-200-100).

This Permittee has no discharge to ground and therefore no limitations are required based on potential effects to ground water.

## *COMPARISON OF EFFLUENT LIMITS WITH THE EXISTING PERMIT*

Table 5 shows that there are no changes in effluent limits from the previous permit. The proposed chlorine limits are the same as the final chlorine limits in the existing permit.

## **MONITORING REQUIREMENTS**

Monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved.

Monitoring of sludge quantity and quality is necessary to determine the appropriate uses of the sludge. Sludge monitoring is required by the current state and local solid waste management program and also by EPA under 40 CFR 503.

**Table 5. Comparison of Effluent Limits with the Existing Permit**

Parameter	Existing Limits		Proposed Limits
BOD			
Month Avg, mg/L	30		30
Month Avg., ppd	15		15
Weekly Avg, mg/L	45		45
Weekly Avg, ppd	22.5		22.5
TSS			
Month Avg, mg/L	30		30
Month Avg., ppd	15		15
Weekly Avg, mg/L	45		45
Weekly Avg, ppd	22.5		22.5
Fecal Coliform			
Monthly Avg.	200/100 ml		200/100 ml
Weekly Avg.	400/100 ml		400/100 ml
pH, allowable range	6.0 - 9.0 Std Units		6.0 - 9.0 Std Units
Total Residual Chlorine	<i>Interim</i>	<i>Final</i>	
Monthly Avg, mg/L	1.0	0.34	0.34
Monthly Avg, ppd	0.5	0.17	0.17
Daily Maximum, mg/L	1.5	0.51	0.51

The monitoring schedule is detailed in the proposed permit under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of Ecology's *Permit Writer's Manual* (July 2002) for all treatment plants with <0.1 MGD average design flow.

A summary of the required monitoring is shown in Table 6.

**Table 6. Required Effluent Monitoring**

Test	Sample Point	Frequency	Sample Type
Flow	Final Effluent	Continuous	Measurement
pH	Final Effluent	5 / week	Grab
BOD <sub>5</sub>	Influent	1 / week	24-hr. Composite
	Final Effluent	1 / week	24-hr. Composite
TSS	Influent	1 / week	24-hr. Composite
	Final Effluent	1 / week	24-hr. Composite
Total Residual Cl <sub>2</sub>	Final Effluent	5 / week	Grab
Fecal Coliform	Final Effluent	2 / week	Grab

### LAB ACCREDITATION

With the exception of certain parameters, the permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of chapter 173-50 WAC, *Accreditation of Environmental Laboratories*. The laboratory at this facility is accredited for BOD/CBOD, chlorine (residual), DO, pH, TSS, and fecal coliform. The LAN (lab accreditation number) is M148.



## OTHER PERMIT CONDITIONS

### *REPORTING AND RECORDKEEPING*

The conditions of S3. are based on the authority to specify any appropriate reporting and record keeping requirements to prevent and control waste discharges (WAC 173-220-210).

### *PREVENTION OF FACILITY OVERLOADING*

Overloading of the treatment plant is a violation of the terms and conditions of the permit. To prevent this from occurring, RCW 90.48.110 and WAC 173-220-150 require the Permittee to take the actions detailed in proposed permit requirement S.4. to plan expansions or modifications before existing capacity is reached and to report and correct conditions that could result in new or increased discharges of pollutants. Condition S.4. restricts the amount of flow.

### *OPERATION AND MAINTENANCE (O&M)*

The proposed permit contains condition S.5. as authorized under RCW 90.48.110, WAC 173-220-150, Chapter 173-230 WAC, and WAC 173-240-080. It is included to ensure proper operation and regular maintenance of equipment, and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment.

### *RESIDUAL SOLIDS HANDLING*

To prevent water quality problems the Permittee is required in permit condition S7. to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and State Water Quality Standards.

The final use and disposal of sewage sludge from this facility is regulated by U.S. EPA under 40 CFR 503, and by Ecology under Chapter 70.95J RCW and Chapter 173-308 WAC. The disposal of other solid waste is under the jurisdiction of the Island County Health Department.

### *PRETREATMENT*

#### FEDERAL AND STATE PRETREATMENT PROGRAM REQUIREMENTS

Under the terms of the addendum to the “Memorandum of Understanding between Washington Department of Ecology and the United States Environmental Protection Agency, Region 10” (1986), the Department of Ecology (Department) has been delegated authority to administer the Pretreatment Program (i.e. act as the Approval Authority for oversight of delegated Publicly Owned Treatment Works (POTWs)). Under this delegation of authority, the Department has exercised the option of issuing wastewater discharge permits for significant industrial users discharging to POTWs which have not been delegated authority to issue wastewater discharge permits.

There are a number of functions required by the Pretreatment Program which the Department is delegating to such POTWs because they are in a better position to implement the requirements (e.g. tracking the number and general nature of industrial dischargers to the sewerage system). The requirements for a Pretreatment Program are contained in Title 40, part 403 of the Code of Federal Regulations. Under the requirements of the Pretreatment Program (40 CFR 403.8(f)(1)(iii)), the Department is required to approve, condition, or deny new discharges or a significant increase in the discharge for existing significant industrial users (SIUs) ( 40 CFR 403.8 (f)(1)(i)).

The Department is responsible for issuing State Waste Discharge Permits to SIUs and other industrial users of the Permittee's sewer system. Industrial dischargers must obtain these permits from the Department prior to the Permittee accepting the discharge (WAC 173-216-110(5)) (Industries discharging wastewater that is similar in character to domestic wastewater are not required to obtain a permit. Such dischargers should contact the Department to determine if a permit is required.). Industrial dischargers need to apply for a State Waste Discharge Permit sixty days prior to commencing discharge. The conditions contained in the permits will include any applicable conditions for categorical discharges, loading limitations included in contracts with the POTW, and other conditions necessary to assure compliance with State water quality standards and biosolids standards.

The Department requires this POTW to fulfill some of the functions required for the Pretreatment Program in the NPDES permit (e.g. tracking the number and general nature of industrial dischargers to the sewage system). The POTW's NPDES permit will require that all SIUs currently discharging to the POTW be identified and notified of the requirement to apply for a wastewater discharge permit from the Department. None of the obligations imposed on the POTW relieve an industrial or commercial discharger of its primary responsibility for obtaining a wastewater discharge permit (if required), including submittal of engineering reports prior to construction or modification of facilities (40 CFR 403.12(j) and WAC 173-216-070 and WAC 173-240-110, et seq.).

#### WASTEWATER PERMIT REQUIRED

RCW 90.48 and WAC 173-216-040 require SIUs to obtain a permit prior to discharge of industrial waste to the Permittee's sewerage system. This provision prohibits the POTW from accepting industrial wastewater from any such dischargers without authorization from the Department.

#### REQUIREMENTS FOR ROUTINE IDENTIFICATION AND REPORTING OF INDUSTRIAL USERS

The NPDES permit requires non-delegated POTWs to " take continuous, routine measures to identify all existing, new, and proposed SIUs and potential significant industrial users (PSIUs) discharging to the Permittee's sewerage system". Examples of such routine measures include regular review of business tax licenses for existing businesses and review of water billing records and existing connection authorization records. System maintenance personnel can also be diligent during performance of their jobs in identifying and reporting as-yet unidentified industrial dischargers. Local newspapers, telephone directories, and word-of-mouth can also be important sources of information regarding new or existing discharges. The POTW is required to notify an industrial discharger, in writing, of their responsibilities regarding application for a State

waste discharge permit and to send a copy of the written notification to the Department. The Department will then take steps to solicit a State waste discharge permit application.

#### DUTY TO ENFORCE DISCHARGE PROHIBITIONS

This provision prohibits the POTW from authorizing or permitting an industrial discharger to discharge certain types of waste into the sanitary sewer. The first portion of the provision prohibits acceptance of pollutants which cause pass through or interference. The definitions of pass through and interference are in Appendix B of the fact sheet..

The second portion of this provision prohibits the POTW from accepting certain specific types of wastes, namely those which are explosive, flammable, excessively acidic, basic, otherwise corrosive, or obstructive to the system. In addition wastes with excessive BOD, petroleum based oils, or which result in toxic gases are prohibited to be discharged. The regulatory basis for these prohibitions is 40 CFR Part 403, with the exception of the pH provisions which are based on WAC 173-216-060.

The third portion of this provision prohibits certain types of discharges unless the POTW receives prior authorization from the Department. The discharges include cooling water in significant volumes, stormwater and other direct inflow sources, and wastewaters significantly affecting system hydraulic loading, which do not require treatment.

#### SUPPORT BY THE DEPARTMENT FOR DEVELOPING PARTIAL PRETREATMENT PROGRAM BY POTW

The Department has committed to providing technical and legal assistance to the Permittee in fulfilling these joint obligations, in particular assistance with developing an adequate sewer use ordinance, notification procedures, enforcement guidelines, and developing local limits and inspection procedures.

#### *OUTFALL EVALUATION*

Proposed permit condition S.8 requires the Permittee to conduct an outfall inspection and submit a report detailing the findings of that inspection. The purpose of the inspection is to determine the condition of the discharge pipe and diffusers and to determine if sediment is accumulating in the vicinity of the outfall.

#### *GENERAL CONDITIONS*

General Conditions are based directly on state and federal law and regulations and have been standardized for all individual municipal NPDES permits issued by the Department.

### **PERMIT ISSUANCE PROCEDURES**

#### *PERMIT MODIFICATIONS*

The Department may modify this permit to impose numerical limitations, if necessary to meet Water Quality Standards, Sediment Quality Standards, or Ground Water Standards, based on

new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

The Department may also modify this permit as a result of new or amended state or federal regulations.

#### *RECOMMENDATION FOR PERMIT ISSUANCE*

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to protect human health, aquatic life, and the beneficial uses of waters of the State of Washington. The Department proposes that this permit be issued for five years.

### **REFERENCES FOR TEXT AND APPENDICES**

Environmental Protection Agency (EPA)

1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.

1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.

1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington, D.C.

1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.

1983. Water Quality Standards Handbook. USEPA Office of Water, Washington, D.C.

Metcalf and Eddy.

1991. Wastewater Engineering, Treatment, Disposal, and Reuse. Third Edition.

Tsivoglou, E.C., and J.R. Wallace.

1972. Characterization of Stream Reaeration Capacity. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

Washington State Department of Ecology.

Laws and Regulations( <http://www.ecy.wa.gov/laws-rules/index.html> )

Permit and Wastewater Related Information  
(<http://www.ecy.wa.gov/programs/wq/wastewater/index.html>)

Washington State Department of Ecology.

1994. Permit Writer's Manual. Publication Number 92-109

Water Pollution Control Federation.

1976. Chlorination of Wastewater.

Wright, R.M., and A.J. McDonnell.

1979. In-stream Deoxygenation Rate Prediction. Journal Environmental Engineering Division, ASCE. 105(E2). (Cited in EPA 1985 op.cit.)

## APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to issue a permit to the applicant listed on page 1 of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of application was published on January 21 and 28, 2004 in the Whidbey News Times to inform the public that an application had been submitted and to invite comment on the issuance of this permit.

The Department will publish a Public Notice of Draft (PNOD) on November 13, 2004, in *The Whidbey News-Times* to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Water Quality Permit Coordinator  
Department of Ecology  
Northwest Regional Office  
3190 160<sup>th</sup> Avenue SE  
Bellevue, WA 98008

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the thirty (30) day comment period to the address above. The request for a hearing shall indicate the interest of the party and the reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-220-090). Public notice regarding any hearing will be circulated at least thirty (30) days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing (WAC 173-220-100).

Comments should reference specific text followed by proposed modification or concern when possible. Comments may address technical issues, accuracy and completeness of information, the scope of the facility's proposed coverage, adequacy of environmental protection, permit conditions, or any other concern that would result from issuance of this permit.

The Department will consider all comments received within thirty (30) days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, 425-649-7201, or by writing to the address listed above.

This permit and fact sheet were written by Alison Evans, facility manager.

## APPENDIX B--GLOSSARY

**Acute Toxicity**--The lethal effect of a pollutant on an organism that occurs within a short period of time, usually 48 to 96 hours.

**AKART**-- An acronym for “all known, available, and reasonable methods of prevention, control, and treatment”.

**Ambient Water Quality**--The existing environmental condition of the water in a receiving water body.

**Ammonia**--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

**Average Monthly Discharge Limitation** --The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month (except in the case of fecal coliform). The daily discharge is calculated as the average measurement of the pollutant over the day.

**Average Weekly Discharge Limitation** -- The highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week. The daily discharge is calculated as the average measurement of the pollutant over the day.

**Best Management Practices (BMPs)**--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

**BOD<sub>5</sub>**--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD<sub>5</sub> is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

**Bypass**--The intentional diversion of waste streams from any portion of a treatment facility.

**CBOD<sub>5</sub>** – The quantity of oxygen utilized by a mixed population of microorganisms acting on the nutrients in the sample in an aerobic oxidation for five days at a controlled temperature of 20 degrees Celcius, with an inhibitory agent added to prevent the oxidation of nitrogen compounds. The method for determining CBOD<sub>5</sub> is given in 40 CFR Part 136.

**Chlorine**--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

**Chronic Toxicity**--The effect of a pollutant on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

**Clean Water Act (CWA)**--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

**Combined Sewer Overflow (CSO)**--The event during which excess combined sewage flow caused by inflow is discharged from a combined sewer, rather than conveyed to the sewage treatment plant because either the capacity of the treatment plant or the combined sewer is exceeded.

**Compliance Inspection - Without Sampling**--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

**Compliance Inspection - With Sampling**--A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the percent removal requirement. Additional sampling may be conducted.

**Composite Sample**--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing a minimum of four discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

**Construction Activity**--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

**Continuous Monitoring** --Uninterrupted, unless otherwise noted in the permit.

**Critical Condition**--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

**Dilution Factor**--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the effluent fraction e.g., a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

**Engineering Report**--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.



**Fecal Coliform Bacteria**--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

**Grab Sample**--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

**Industrial User**-- A discharger of wastewater to the sanitary sewer which is not sanitary wastewater or is not equivalent to sanitary wastewater in character.

**Industrial Wastewater**--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

**Infiltration and Inflow (I/I)**--"Infiltration" means the addition of ground water into a sewer through joints, the sewer pipe material, cracks, and other defects. "Inflow" means the addition of precipitation-caused drainage from roof drains, yard drains, basement drains, street catch basins, etc., into a sewer.

**Interference** -- A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal and;

Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), sludge regulations appearing in 40 CFR Part 507, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

**Major Facility**--A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

**Maximum Daily Discharge Limitation**--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

**Method Detection Level (MDL)**--The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.

**Minor Facility**--A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

**Mixing Zone**--A volume that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in State regulations (Chapter 173-201A WAC).

**National Pollutant Discharge Elimination System (NPDES)**--The NPDES (Section 402 of the Clean Water Act) is the Federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the State of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both State and Federal laws.

**Pass through** -- A discharge which exits the POTW into waters of the State in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation), or which is a cause of a violation of State water quality standards.

**pH**--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

**Potential Significant Industrial User**--A potential significant industrial user is defined as an Industrial User which does not meet the criteria for a Significant Industrial User, but which discharges wastewater meeting one or more of the following criteria:

- a. Exceeds 0.5 % of treatment plant design capacity criteria and discharges <25,000 gallons per day or;
- b. Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (e.g. facilities which develop photographic film or paper, and car washes).

The Department may determine that a discharger initially classified as a potential significant industrial user should be managed as a significant industrial user.

**Quantitation Level (QL)**-- A calculated value five times the MDL (method detection level).

**Significant Industrial User (SIU)**--

- 1) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N and;
- 2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority\* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

Upon finding that the industrial user meeting the criteria in paragraph 2, above, has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority\* may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

\*The term "Control Authority" refers to the Washington State Department of Ecology in the case of non-delegated POTWs or to the POTW in the case of delegated POTWs.

**State Waters**--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, wetlands, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

**Stormwater**--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

**Technology-based Effluent Limit**--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

**Total Suspended Solids (TSS)**--Total suspended solids are the particulate materials in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

**Upset**--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

**Water Quality-based Effluent Limit**--A limit on the concentration or mass of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

## APPENDIX C--TECHNICAL CALCULATIONS

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on the Department's homepage at <http://www.ecy.wa.gov/programs/wq/wastewater/index.html>

### PLUMES DILUTION ZONE MODEL RUN – SINGLE PORT DIFFUSER

#### WORST CASE CHRONIC

FLOW: 60,000 GPD, CHRONIC BOUNDARY: 250 FEET (76 M)

```

Jun 21, 1999, 16:59:35 ERL-N PROGRAM PLUMES, Ed 3, 3/11/94 Case: 2 of 8
Title PENN COVE VALIDATION linear
tot flow # ports port flow spacing effl sal effl temp far inc far dis
0.002629 1 0.002629 1000 0 14.9 2 120
port dep port dia plume dia total vel horiz vel vertl vel asp coeff print frq
15.2 0.2540 0.2540 0.05188 0.04493 0.02594 0.1 500
port elev ver angle cont coef effl den poll conc decay Froude # Roberts F
0.3 30 1.0 -0.821303 100 0.000 0.2045 23.45
hor angle red space p amb den p current far dif far vel K:vel/cur Stratif #
90 1000.0 25.0000 0.02500 0.0003 0.025 2.075 0.004983
depth current density salinity temp amb conc N (freq) red grav.
0.0 0.025 17.3 0 0.06962 0.2534
10 0.025 24.0 0 buoy flux puff-ther
15.2 0.025 25.0 0 6.663E-07 0.1038
0 jet-plume jet-cross
0 0.04890 0.4672
0 plu-cross jet-strat
0 42.64 0.4096
plu-strat
1.185
hor dis>=

```

```

FORMIX1 flow category algorithm is turned off.
0.0003 m2/3/s 0.0001 to 0.0005 m2/3/s range
help: F1. Quit: <esc>. Configuration:ATNO0. FILE: PENNCOV2.VAR;
INITIAL DILUTION CALCULATION (linear mode)
plume dep plume dia poll conc dilution hor dis
m m
15.20 0.2540 100.0 1.000 0.000
12.23 0.8980 3.125 31.23 0.5108
10.34 1.712 1.351 72.23 0.9851 -> trap level
9.613 2.576 0.9686 100.7 1.280 -> begin overlap
WASTEFIELD CALCULATION (based on Brooks, 1960, see guide)
Wastefield dispersion based on wastefield width of 2.576m
--4/3 Power Law-- -Const Eddy Diff-
conc dilution conc dilution distance Time
m sec hrs
0.9678 100.8 0.9678 100.8 2.000 28.79 0.0
0.9569 102.0 0.9616 101.5 4.000 108.8 0.0
0.9026 108.3 0.9290 105.1 6.000 188.8 0.1
0.8295 118.1 0.8853 110.4 8.000 268.8 0.1
0.7566 129.7 0.8414 116.3 10.00 348.8 0.1
0.6901 142.4 0.8009 122.4 12.00 428.8 0.1
0.6311 155.9 0.7645 128.3 14.00 508.8 0.1
0.5793 170.1 0.7319 134.1 16.00 588.8 0.2
0.5337 184.9 0.7028 139.8 18.00 668.8 0.2
0.4936 200.1 0.6767 145.3 20.00 748.8 0.2
0.4581 215.8 0.6531 150.6 22.00 828.8 0.2
0.4266 231.9 0.6317 155.8 24.00 908.8 0.3
0.3985 248.4 0.6122 160.8 26.00 988.8 0.3
0.3733 265.4 0.5944 165.7 28.00 1069 0.3
0.3506 282.7 0.5780 170.5 30.00 1149 0.3
0.3301 300.4 0.5629 175.1 32.00 1229 0.3
0.3115 318.5 0.5489 179.7 34.00 1309 0.4
0.2946 336.9 0.5359 184.1 36.00 1389 0.4
0.2792 355.7 0.5238 188.4 38.00 1469 0.4
0.2651 374.8 0.5124 192.7 40.00 1549 0.4
0.2521 394.2 0.5017 196.8 42.00 1629 0.5
0.2401 413.9 0.4917 200.9 44.00 1709 0.5
0.2291 434.0 0.4822 204.9 46.00 1789 0.5

```

**APPENDIX C (CONTINUED) - SINGLE PORT DIFFUSER  
WORST CASE CHRONIC (CONTINUED)**

0.2189	454.4	0.4733	208.8	48.00	1869	0.5
0.2094	475.1	0.4648	212.6	50.00	1949	0.5
0.2005	496.1	0.4568	216.4	52.00	2029	0.6
0.1923	517.5	0.4492	220.1	54.00	2109	0.6
0.1846	539.1	0.4420	223.8	56.00	2189	0.6
0.1775	561.0	0.4350	227.4	58.00	2269	0.6
0.1707	583.3	0.4284	230.9	60.00	2349	0.7
0.1644	605.6	0.4221	234.4	62.00	2429	0.7
0.1585	628.3	0.4161	237.8	64.00	2509	0.7
0.1529	651.4	0.4103	241.2	66.00	2589	0.7
0.1477	674.7	0.4048	244.6	68.00	2669	0.7
0.1427	698.2	0.3994	247.9	70.00	2749	0.8
0.1380	722.1	0.3943	251.1	72.00	2829	0.8
0.1336	746.2	0.3893	254.3	74.00	2909	0.8
0.1294	770.6	0.3846	257.5	76.00	2989	0.8
0.1254	795.2	0.3800	260.7	78.00	3069	0.9
0.1216	820.1	0.3756	263.8	80.00	3149	0.9
0.1180	845.2	0.3713	266.8	82.00	3229	0.9
0.1145	870.6	0.3671	269.9	84.00	3309	0.9
0.1113	896.3	0.3631	272.9	86.00	3389	0.9
0.1081	922.2	0.3593	275.8	88.00	3469	1.0
0.1052	948.3	0.3555	278.8	90.00	3549	1.0
0.1023	974.7	0.3519	281.7	92.00	3629	1.0
0.09962	1001.3	0.3484	284.5	94.00	3709	1.0
0.09702	1028.2	0.3450	287.4	96.00	3789	1.1
0.09454	1055.3	0.3417	290.2	98.00	3869	1.1
0.09216	1082.6	0.3384	293.0	100.0	3949	1.1
0.08987	1110.2	0.3353	295.7	102.0	4029	1.1
0.08768	1138.0	0.3322	298.5	104.0	4109	1.1
0.08558	1166.0	0.3293	301.2	106.0	4189	1.2
0.08356	1194.2	0.3264	303.9	108.0	4269	1.2
0.08162	1222.7	0.3236	306.5	110.0	4349	1.2
0.07975	1251.4	0.3208	309.2	112.0	4429	1.2
0.07795	1280.3	0.3182	311.8	114.0	4509	1.3
0.07622	1309.5	0.3155	314.4	116.0	4589	1.3
0.07455	1338.8	0.3130	317.0	118.0	4669	1.3
0.07295	1368.4	0.3105	319.5	120.0	4749	1.3

# APPENDIX C (CONTINUED) - PLUMES DILUTION ZONE MODEL RUN - SINGLE PORT DIFFUSER WORST CASE ACUTE

FLOW: 100,000 GPD, ACUTE BOUNDARY: 25 FEET (7.6 M)

```

Jun 21, 1999, 16:45:25 ERL-N PROGRAM PLUMES, Ed 3, 3/11/94 Case: 1 of 7
Title USING BEAK CONS. DATA - HIGH FLOWS, ACUTE linear
tot flow # ports port flow spacing effl sal effl temp far inc far dis
0.004381 1 0.004381 1000 0 14.9 0.2 15
port dep port dia plume dia total vel horiz vel vertl vel asp coeff print frq
15.2 0.254 0.2540 0.08646 0.06114 0.06114 0.1 500
port elev ver angle cont coef effl den poll conc decay Froude # Roberts F
0 45 1.0 -0.821303 100 0 0.3408 0.9006
hor angle red space p amb den p current far dif far vel K:vel/cur Stratif #
90 1000.0 25 0.01 0.0003 0.025 8.646 0.004983
depth current density salinity temp amb conc N (freq) red grav.
0.0 0.01 17.3 0 0.06962 0.2534
10 0.01 24.0 0 buoy flux puff-ther
15.2 0.01000 25.0000 0 1.110E-06 0.2347
0 jet-plume jet-cross
0.08148 1.946
plu-cross jet-strat
1110 0.5287
plu-strat
1.347
hor dis>=

```

JORMIX1 flow category algorithm is turned off.  
-0.821303 sigma-t, 999.179 kg/m3, 0.999179 gm/cm3. -100 to ~200 sigma-t range  
help: F1. Quit: <esc>. Configuration:ATNO3. FILE: PENNCOV2.VAR;  
JM INITIAL DILUTION CALCULATION (linear mode)

```

plume dep plume dia poll conc dilution hor dis
m m m
15.20 0.2540 100.0 1.000 0.000

15.20 0.2549 99.31 1.007 0.003296 -> bottom hit
-> absolute value Froude # < 1, potential diffuser intrusion
11.27 1.097 3.125 31.23 0.3819
9.788 1.557 1.978 49.34 0.5126 -> trap level
8.726 2.833 1.530 63.77 0.6597 -> begin overlap

```

FARFIELD CALCULATION (based on Brooks, 1960, see guide)  
Farfield dispersion based on wastefield width of 2.833m

```

--4/3 Power Law-- -Const Eddy Diff-
conc dilution conc dilution distance Time
m sec hrs
1.526 63.9 1.526 63.9 0.8000 5.611 0.0
1.528 63.9 1.528 63.9 1.000 13.61 0.0
1.529 63.8 1.529 63.8 1.200 21.61 0.0
1.529 63.8 1.529 63.8 1.400 29.61 0.0
1.529 63.8 1.529 63.8 1.600 37.61 0.0
1.530 63.8 1.530 63.8 1.800 45.61 0.0
1.530 63.8 1.530 63.8 2.000 53.61 0.0
1.529 63.8 1.530 63.8 2.200 61.61 0.0
1.529 63.8 1.529 63.8 2.400 69.61 0.0
1.528 63.9 1.529 63.8 2.600 77.61 0.0
1.526 64.0 1.528 63.9 2.800 85.61 0.0
1.523 64.1 1.526 64.0 3.000 93.61 0.0
1.520 64.2 1.524 64.0 3.200 101.6 0.0
1.516 64.4 1.522 64.1 3.400 109.6 0.0
1.511 64.6 1.519 64.3 3.600 117.6 0.0
1.505 64.9 1.515 64.4 3.800 125.6 0.0
1.499 65.1 1.512 64.6 4.000 133.6 0.0
1.492 65.4 1.508 64.8 4.200 141.6 0.0
1.485 65.8 1.503 65.0 4.400 149.6 0.0
1.477 66.1 1.498 65.2 4.600 157.6 0.0
1.468 66.5 1.493 65.4 4.800 165.6 0.0

```

**APPENDIX C (CONTINUED) - SINGLE PORT DIFFUSER**  
**WORST CASE ACUTE (CONTINUED)**

---

1.459	67.0	1.488	65.6	5.000	173.6	0.0
1.450	67.4	1.482	65.9	5.200	181.6	0.1
1.440	67.8	1.477	66.2	5.400	189.6	0.1
1.431	68.3	1.471	66.4	5.600	197.6	0.1
1.420	68.8	1.464	66.7	5.800	205.6	0.1
1.410	69.4	1.458	67.0	6.000	213.6	0.1
1.399	69.9	1.452	67.3	6.200	221.6	0.1
1.389	70.4	1.446	67.6	6.400	229.6	0.1
1.378	71.0	1.439	67.9	6.600	237.6	0.1
1.367	71.6	1.433	68.2	6.800	245.6	0.1
1.356	72.2	1.426	68.6	7.000	253.6	0.1
1.345	72.8	1.419	68.9	7.200	261.6	0.1
1.334	73.4	1.413	69.2	7.400	269.6	0.1
1.323	74.0	1.406	69.5	7.600	277.6	0.1
1.312	74.7	1.399	69.9	7.800	285.6	0.1
1.301	75.3	1.393	70.2	8.000	293.6	0.1
1.290	76.0	1.386	70.6	8.200	301.6	0.1
1.279	76.6	1.380	70.9	8.400	309.6	0.1
1.268	77.3	1.373	71.3	8.600	317.6	0.1
1.257	78.0	1.366	71.6	8.800	325.6	0.1
1.246	78.7	1.360	72.0	9.000	333.6	0.1
1.235	79.4	1.353	72.3	9.200	341.6	0.1
1.224	80.1	1.347	72.7	9.400	349.6	0.1
1.214	80.8	1.341	73.0	9.600	357.6	0.1
1.203	81.5	1.334	73.4	9.800	365.6	0.1
1.193	82.3	1.328	73.7	10.000	373.6	0.1
1.183	83.0	1.322	74.1	10.20	381.6	0.1
1.172	83.7	1.315	74.4	10.40	389.6	0.1
1.162	84.5	1.309	74.8	10.60	397.6	0.1
1.152	85.2	1.303	75.2	10.80	405.6	0.1
1.142	86.0	1.297	75.5	11.00	413.6	0.1
1.132	86.7	1.291	75.9	11.20	421.6	0.1
1.123	87.5	1.285	76.2	11.40	429.6	0.1
1.113	88.3	1.279	76.6	11.60	437.6	0.1
1.104	89.0	1.274	77.0	11.80	445.6	0.1
1.094	89.8	1.268	77.3	12.00	453.6	0.1
1.085	90.6	1.262	77.7	12.20	461.6	0.1
1.076	91.4	1.256	78.0	12.40	469.6	0.1
1.067	92.2	1.251	78.4	12.60	477.6	0.1
1.058	93.0	1.245	78.7	12.80	485.6	0.1
1.049	93.8	1.240	79.1	13.00	493.6	0.1
1.040	94.6	1.234	79.4	13.20	501.6	0.1
1.031	95.4	1.229	79.8	13.40	509.6	0.1
1.023	96.2	1.224	80.1	13.60	517.6	0.1
1.014	97.0	1.219	80.5	13.80	525.6	0.1
1.006	97.8	1.213	80.8	14.00	533.6	0.1
0.9977	98.7	1.208	81.2	14.20	541.6	0.2
0.9894	99.5	1.203	81.5	14.40	549.6	0.2
0.9814	100.3	1.198	81.9	14.60	557.6	0.2
0.9734	101.2	1.193	82.2	14.80	565.6	0.2
0.9656	102.0	1.188	82.6	15.00	573.6	0.2
0.9656	102.0	1.188	82.6	15.00	573.6	0.2

# APPENDIX C (CONTINUED) - FUTURE THREE PORT DIFFUSER

## WORST CASE CHRONIC

FLOW: 60,000 GPD, CHRONIC BOUNDARY: 270 FEET (81 M)

/ UM3. 1/20/2005 2:38:03 PM

Case 1; ambient file C:\Plumes\penn\_60gpd.004.002.001.db; Diffuser table record 1: -----

### Ambient Table:

Depth m	Amb-cur m/s	Amb-dir deg	Amb-sal psu	Amb-tem C	Amb-pol kg/kg	Decay s-1	Far-sp m/s	Far-dir deg	Disprsn m0.67/s2	Density sigma-T
0.0	0.025	0.0	13.44	9.93	0.0	0.0	0.025	0.0	0.0003	10.24
10.0	0.025	0.0	28.71	11.68	0.0	0.0	0.025	0.0	0.0003	21.8
30.0	0.025	0.0	29.31	11.77	0.0	0.0	0.025	0.0	0.0003	22.25

### Diffuser table:

P-dia (in)	P-elev (ft)	V-angle (deg)	H-angle (deg)	Ports (in)	Spacing (ft)	AcuteMZ (ft)	ChrcMZ (ft)	P-depth (ft)	Ttl-fl (MGD)	Eff-sal (psu)	Temp (C)	Polutnt (ppm)
3.0	0.5	60.0	0.0	3.0	5.0	25.0	250.0	49.5	0.06	0.0	18.33	100.0

### Simulation:

Froude number: 1.455; effluent density (sigma-T) -1.40269292; effluent velocity 0.192(m/s);

Depth Amb-cur P-dia Polutnt Dilutn CL-diln x-posn y-posn

Step	(ft)	(m/s)	(in)	(ppm)	(in)	(ft)	(ft)	(ft)	(ft)
0	49.5	0.025	3.0	100.0	1.0	1.0	0.0	0.0;	
100	47.49	0.025	9.158	13.8	7.102	3.611	0.62	0.0;	
200	41.79	0.025	31.02	1.905	51.31	25.59	2.129	0.0;	
276	32.23	0.025	82.49	0.423	231.0	108.4	5.784	0.0; trap level;	
280	31.82	0.025	89.07	0.4	244.1	111.9	6.0	0.0; begin overlap;	
300	31.29	0.025	106.7	0.381	256.5	111.9	6.36	0.0;	
385	31.0	0.025	133.6	0.375	260.7	111.9	6.855	0.0; local maximum rise or fall;	

Plumes not merged, Brooks method may be overly conservative.

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 13.39 m

conc (ppm)	dilutn (m)	width (m)	distnce (m)	time (hrs)	(ppm)	(s-1)	(m/s)	(m0.67/s2)
0.37461	260.9	14.03	4.0	0.0212	0.0	0.0	0.025	3.00E-4
0.37477	260.8	14.67	6.0	0.0435	0.0	0.0	0.025	3.00E-4
0.37256	262.4	15.87	10.0	0.0879	0.0	0.0	0.025	3.00E-4
0.36527	267.7	16.98	14.0	0.132	0.0	0.0	0.025	3.00E-4
0.35486	275.8	18.03	18.0	0.177	0.0	0.0	0.025	3.00E-4
0.34342	285.2	19.02	22.0	0.221	0.0	0.0	0.025	3.00E-4
0.33196	295.2	19.96	26.0	0.266	0.0	0.0	0.025	3.00E-4
0.32637	300.4	20.41	28.0	0.288	0.0	0.0	0.025	3.00E-4
0.3157	310.7	21.29	32.0	0.332	0.0	0.0	0.025	3.00E-4
0.30571	321.1	22.14	36.0	0.377	0.0	0.0	0.025	3.00E-4
0.29644	331.3	22.95	40.0	0.421	0.0	0.0	0.025	3.00E-4
0.29204	336.4	23.34	42.0	0.443	0.0	0.0	0.025	3.00E-4
0.28377	346.4	24.12	46.0	0.488	0.0	0.0	0.025	3.00E-4
0.27608	356.2	24.86	50.0	0.532	0.0	0.0	0.025	3.00E-4
0.27243	361.0	25.23	52.0	0.555	0.0	0.0	0.025	3.00E-4
0.26553	370.6	25.95	56.0	0.599	0.0	0.0	0.025	3.00E-4
0.25911	379.9	26.64	60.0	0.643	0.0	0.0	0.025	3.00E-4
0.25606	384.5	26.98	62.0	0.666	0.0	0.0	0.025	3.00E-4
0.25024	393.6	27.65	66.0	0.71	0.0	0.0	0.025	3.00E-4
0.24747	398.1	27.98	68.0	0.732	0.0	0.0	0.025	3.00E-4
0.24215	406.9	28.63	72.0	0.777	0.0	0.0	0.025	3.00E-4
0.23841	413.4	29.11	75.0	0.81	0.0	0.0	0.025	3.00E-4
0.2372	415.6	29.26	76.0	0.821	0.0	0.0	0.025	3.00E-4
0.23367	421.9	29.73	79.0	0.855	0.0	0.0	0.025	3.00E-4

0.23139	<b>426.1</b>	30.04	<b>81.0</b>	0.877	0.0	0.0	0.025	3.00E-4	<b>DF = 426</b>
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count: 38 ; 2:38:03 PM. amb fills: 2



## APPENDIX C (CONTINUED) - FUTURE THREE PORT DIFFUSER

### WORST CASE ACUTE

FLOW: 300,000 GPD, ACUTE BOUNDARY: 27 FEET (8.1 M)

/ UM3. 1/20/2005 2:42:59 PM

Case 1; ambient file C:\Plumes\penn\_60gpd.004.002.001.db; Diffuser table record 1: -----

#### Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-sp	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.025	0.0	13.44	9.93	0.0	0.0	0.025	0.0	0.0003	10.24
10.0	0.025	0.0	28.71	11.68	0.0	0.0	0.025	0.0	0.0003	21.8
30.0	0.025	0.0	29.31	11.77	0.0	0.0	0.025	0.0	0.0003	22.25

#### Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	Spacing	AcuteMZ	ChrcMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(in)	(ft)	(deg)	(deg)	(in)	(ft)	(ft)	(ft)	(MGD)	(psu)	(C)	(ppm)	
3.0	0.5	60.0	0.0	3.0	5.0	25.0	250.0	49.5	0.3	0.0	18.33	100.0

#### Simulation:

Froude number: 7.273; effluent density (sigma-T) -1.40269292; effluent velocity 0.961(m/s);

Depth Amb-cur P-dia Polutnt Dilutn CL-diln x-posn y-posn

Step (ft) (m/s) (in) (ppm) ( ) ( ) (ft) (ft)

0	49.5	0.025	3.0	100.0	1.0	1.0	0.0	0.0;
100	46.48	0.025	16.27	13.8	7.102	3.61	1.515	0.0;
200	34.32	0.025	57.74	1.905	51.31	26.0	5.118	0.0;
214	31.32	0.025	69.88	1.444	67.7	34.14	5.917	0.0; trap level;
226	29.52	0.025	91.99	1.224	79.88	38.94	6.514	0.0; begin overlap;
300	28.6	0.025	147.9	1.162	84.17	39.02	7.154	0.0;
342	28.57	0.025	155.1	1.16	84.26	39.02	7.287	0.0; local maximum rise or fall;

Plumes not merged, Brooks method may be overly conservative.

4/3 Power Law. Farfield dispersion based on wastefield width of 13.94 m

conc dilutn width distance time

(ppm) (m) (m) (hrs) (ppm) (s-1) (m/s)(m0.67/s2)

1.15674	84.53	14.04	2.5	0.0031	0.0	0.0	0.025	3.00E-4
1.1582	84.42	14.21	3.0	0.00866	0.0	0.0	0.025	3.00E-4
1.15883	84.37	14.39	3.5	0.0142	0.0	0.0	0.025	3.00E-4
1.15919	84.35	14.56	4.0	0.0198	0.0	0.0	0.025	3.00E-4
1.15944	84.33	14.74	4.5	0.0253	0.0	0.0	0.025	3.00E-4
1.15963	84.31	14.91	5.0	0.0309	0.0	0.0	0.025	3.00E-4
1.15975	84.3	15.09	5.5	0.0364	0.0	0.0	0.025	3.00E-4
1.15979	84.3	15.27	6.0	0.042	0.0	0.0	0.025	3.00E-4
1.15969	84.31	15.45	6.5	0.0475	0.0	0.0	0.025	3.00E-4
1.1594	84.33	15.63	7.0	0.0531	0.0	0.0	0.025	3.00E-4
1.15883	84.37	15.81	7.5	0.0587	0.0	0.0	0.025	3.00E-4

1.15793	84.44	15.99	8.0	0.0642	0.0	0.0	0.025	3.00E-4	DF = 84
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1.15664	84.54	16.17	8.5	0.0698	0.0	0.0	0.025	3.00E-4
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1.15492	84.66	16.35	9.0	0.0753	0.0	0.0	0.025	3.00E-4
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0.8357	117.7	26.51	34.5	0.359	0.0	0.0	0.025	3.00E-4
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0.71362	138.2	31.37	45.5	0.481	0.0	0.0	0.025	3.00E-4
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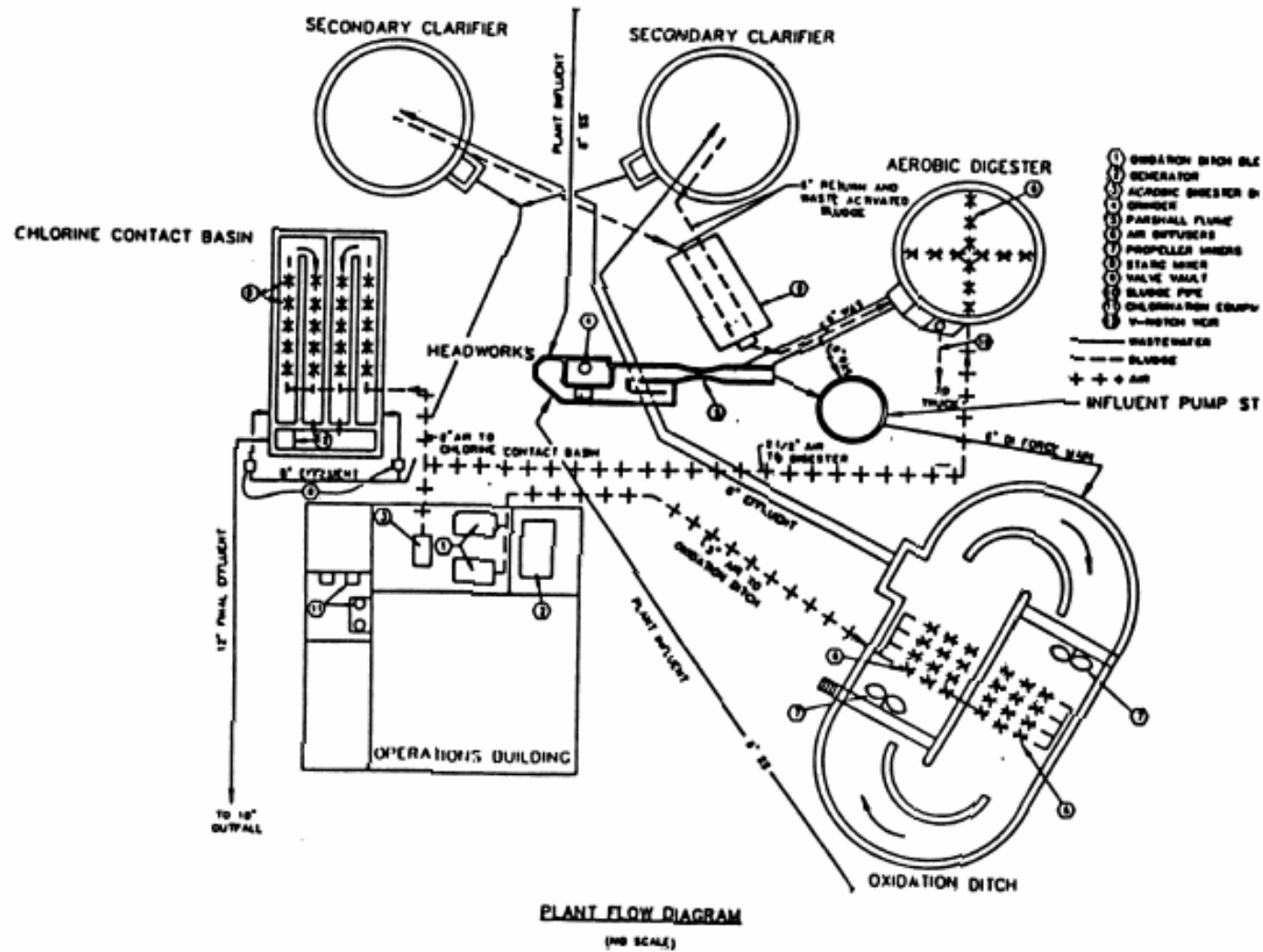
0.70872	139.2	31.6	46.0	0.486	0.0	0.0	0.025	3.00E-4
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count: 149; 2:43:00 PM. amb fills: 2

## **APPENDIX D--RESPONSE TO COMMENTS**

No comments were received during the public review period. However, a typographical error was found in the last paragraph on page 6 of the permit. The acute and chronic dilutions were reported as 30:1 and 50:1, respectively. The correct values are 74:1 and 258:1, respectively, for the existing single port diffuser. The dilution numbers were reported and used correctly elsewhere in the permit and fact sheet, so this change has no impact on any other discussions or calculated effluent limits.

## APPENDIX E — LAYOUT DIAGRAM OF TREATMENT FACILITY

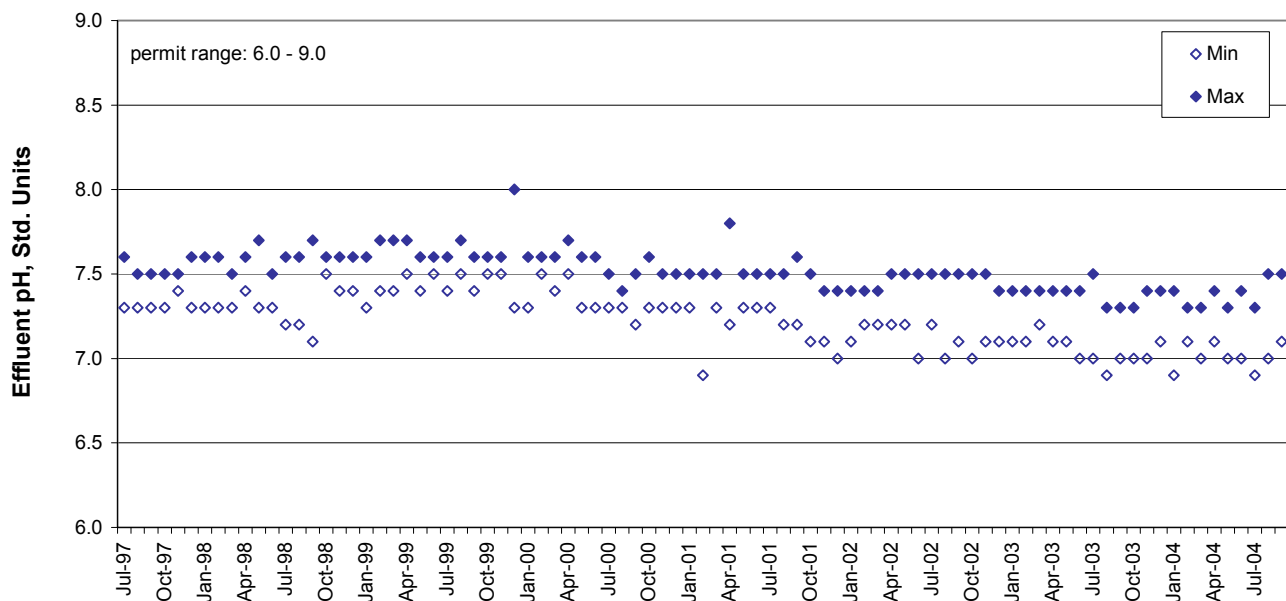
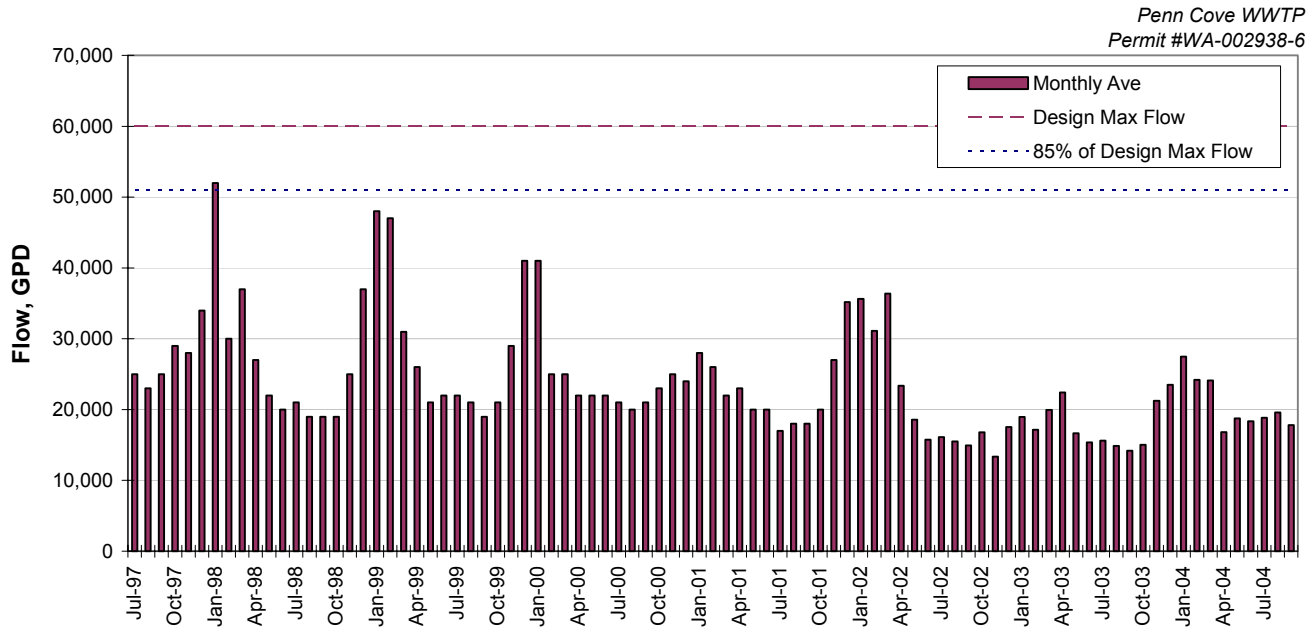


## APPENDIX F — DISCHARGE MONITORING DATA. 1997 – 2004

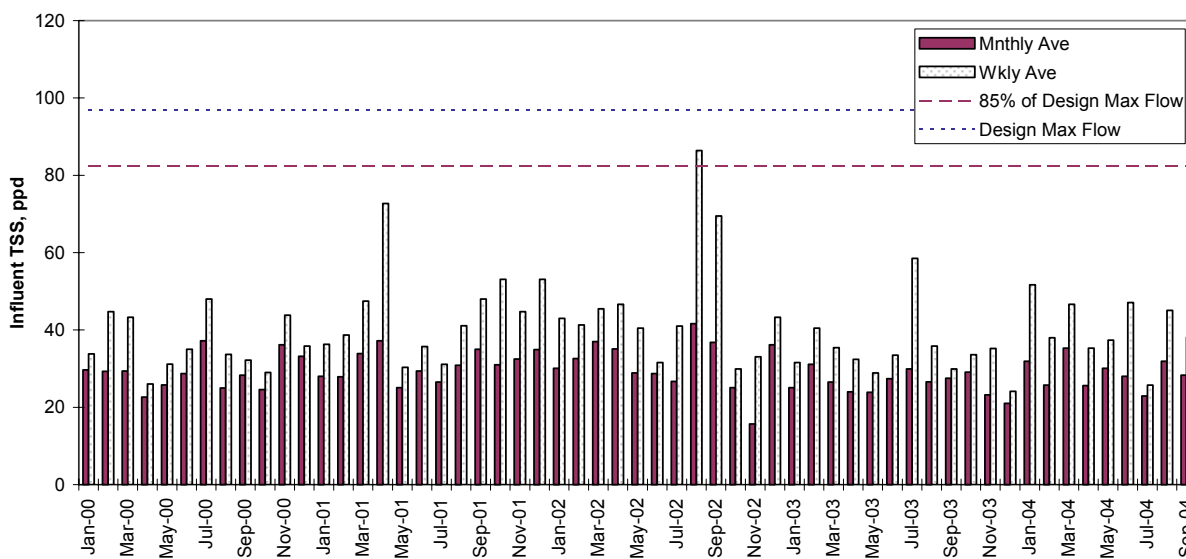
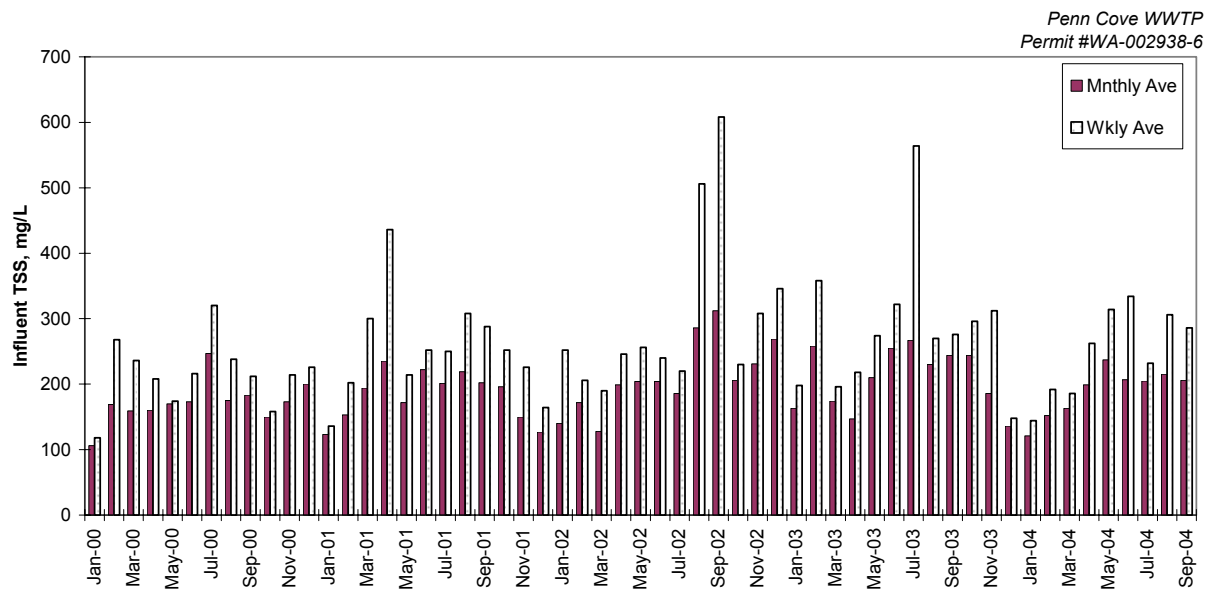
Facility: Penn Cove WWTP  
Permit No: WA-002938-6

Date	Influent								Effluent																							
	BOD, mg/L		BOD, mg/L		BOD, ppd		BOD, ppd		TSS, mg/L		TSS, mg/L		TSS, ppd		TSS, ppd		TSS, % Removal		pH		pH		Fecal Coliform, #/100 ml		Fecal Coliform, #/100 ml		Chlorine, mg/L		Chlorine, mg/L		Chlorine, ppd	
	Monthly Ave	Wkly Ave	Monthly Ave	Wkly Ave	Monthly Ave	Wkly Ave	Monthly Ave	Wkly Ave	Monthly Ave	Wkly Ave	Monthly Ave	Wkly Ave	Monthly Ave	Wkly Ave	Monthly Ave	Wkly Ave	Monthly Ave	Wkly Ave	Monthly Ave	Wkly Ave	Monthly Ave	Wkly Ave	Monthly Ave	Wkly Ave	Monthly Ave	Wkly Ave	Monthly Ave	Wkly Ave	Monthly Ave	Wkly Ave	Monthly Ave	Wkly Ave
	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD	Flow, GPD
1-Jul-97	315	443	64	85	162	284	34	57	25,000	45,000	3	4	1	1	99	6	6	1.19	2.25	96	7.3	7.6	0	278	0.60	1.42						
1-Aug-97	365	461	61	73	225	294	38	47	23,000	33,000	3	4	0	1	99	7	9	1.05	1.35	97	7.3	7.5	0	14	0.69	1.34						
1-Sep-97	507	543	92	106	216	270	39	50	25,000	32,000	3	4	1	1	99	8	12	1.25	2.00	97	7.3	7.5	0	31	0.84	2.20						
1-Oct-97	224	342	47	66	160	240	34	46	29,000	60,000	4	5	1	2	98	8	9	1.96	3.74	94	7.3	7.5	3	12	0.61	1.35						
1-Nov-97	232	323	50	81	160	206	34	52	28,000	37,000	5	6	1	1	98	8	10	1.62	2.25	95	7.4	7.5	2	4	0.74	1.39						
1-Dec-97	246	290	65	95	150	166	39	57	34,000	52,000	5	5	1	2	98	9	10	2.17	3.34	94	7.3	7.6	29	273	0.62	0.99						
1-Jan-98	197	264	62	66	90.5	116	28	30	52,000	93,000	4	5	1	2	98	9	12	2.84	3.40	90	7.3	7.6	7	38	0.53	0.67						
1-Feb-98	393	685	93	171	203	344	47	86	30,000	38,000	3	3	1	1	99	9	10	1.86	2.34	95	7.3	7.6	1	1	0.73	1.27						
1-Mar-98	221	268	52	69	157	196	37	51	37,000	69,000	4	5	1	2	98	8	12	1.91	4.30	95	7.3	7.5	3	7	0.56	0.87						
1-Apr-98	229	285	48	78	140	176	28	35	27,000	41,000	3	4	1	1	99	6	7	1.23	2.05	95	7.4	7.6	9	34	0.64	0.90						
1-May-98	310	344	55	67	209	286	37	52	22,000	59,000	4	5	1	1	99	5	5	0.89	1.10	98	7.3	7.7	2	5	0.66	1.11						
1-Jun-98	324	420	50	65	238	344	36	52	20,000	28,000	4	5	1	1	99	9	10	1.37	1.83	96	7.3	7.5	7	16	0.70	1.03						
1-Jul-98	291	347	39	49	222	282	31	49	21,000	33,000	4	4	0	1	99	6	8	0.74	1.00	97	7.2	7.6	22	170	0.68	1.15						
1-Aug-98	363	444	46	56	277	446	35	56	19,000	26,000	3	4	0	0	99	5	6	0.67	0.75	98	7.2	7.6	7	56	0.75	1.03						
1-Sep-98	322	380	52	60	219	324	35	51	19,000	31,000	2	3	0	1	99	6	7	1.14	1.46	97	7.1	7.7	10	41	0.79	1.50						
1-Oct-98	318	391	45	55	206	250	29	33	19,000	31,000	4	5	1	1	99	8	11	1.21	1.58	96	7.5	7.6	0	0	0.96	1.49						
1-Nov-98	318	411	61	69	190	244	36	47	25,000	41,000	3	4	1	1	99	7	9	1.35	1.69	96	7.4	7.6	3	19	0.80	1.38						
1-Dec-98	209	295	51	59	139	210	34	42	37,000	97,000	3	4	1	1	98	7	9	1.69	1.96	95	7.4	7.6	52	287	0.70	1.22						
1-Jan-99	167	205	60	94	99	132	35	46	48,000	76,000	4	4	1	2	98	8	11	3.06	4.49	91	7.3	7.6	35	208	0.66	1.83						
1-Feb-99	186	235	58	80	108	156	33	48	47,000	99,000	3	3	1	1	99	9	12	2.45	3.50	92	7.4	7.7	22	44	0.57	0.96						
1-Mar-99	169	202	44	55	132	204	34	43	31,000	75,000	4	4	1	2	98	10	13	2.50	4.70	92	7.4	7.7	7	30	0.69	1.60						
1-Apr-99	251	326	48	63	166	214	32	41	26,000	40,000	4	5	1	1	98	6	7	1.07	1.17	96	7.5	7.7	2	4	0.70	1.23						
1-May-99	368	378	47	53	171	198	22	28	21,000	32,000	4	5	1	1	99	8	9	0.97	1.20	96	7.4	7.6	2	4	0.71	1.89						
1-Jun-99	264	291	43	51	168	184	27	32	22,000	46,000	4	5	1	1	98	9	13	1.49	2.49	95	7.5	7.6	2	3	0.51	0.89						
1-Jul-99	301	354	44	55	216	316	31	40	22,000	36,000	4	4	1	1	99	10	24	1.40	3.20	95	7.4	7.6	4	15	0.54	1.30						
1-Aug-99	275	343	38	43	213	298	30	37	21,000	27,000	3	5	0	1	99	6	7	0.82	1.25	98	7.5	7.7	3	11	0.47	0.66						
1-Sep-99	332	458	45	57	258	376	34	47	19,000	31,000	4	5	1	1	99	9	10	1.21	1.50	97	7.4	7.6	2	6	0.67	1.00						
1-Oct-99	378	469	57	70	225	292	34	44	21,000	26,000	4	5	1	1	99	11	12	1.51	1.60	95	7.5	7.6	8	50	0.71	1.02						
1-Nov-99	353	502	65	77	191	314	34	42	29,000	73,000	3	3	0	1	99	6	8	1.09	1.35	97	7.5	7.6	2	3	0.58	0.94						
1-Dec-99	142	186	41	51	112	138	34	53	41,000	101,000	4	5	1	3	97	8	9	2.63	5.07	92	7.3	8.0	21	163	0.69	1.49						
1-Jan-00	124	138	34	38	106	118	30	34	41,000	56,000	4	5	1	1	97	8	8	2.16	2.67	93	7.3	7.6	5	30	0.64	1.05						
1-Feb-00	219	311	38	52	169	268	29	45	25,000	31,000	4	4	1	1	98	8	9	1.33	1.53	95	7.5	7.6	1	3	0.84	1.38						
1-Mar-00	176	220	33	40	159	236	29	43	25,000	40,000	4	6	1	1	97	7	8	1.20	1.40	96	7.4	7.6	11	83	0.52	0.81						
1-Apr-00	192	225	27	30	160	208	23	26	22,000	35,000	7	9	1	1	97	7	8	0.96	1.13	96	7.5	7.7	9	43	0.49	0.72						
1-May-00	165	202	26	37	170	174	26	31	22,000	34,000	6	7	1	1	96	12	13	1.69	2.10	93	7.3	7.6	23	143	0.51	0.79						
1-Jun-00	150	156	25	27	173	216	29	35	22,000	35,000	5	5	1	1	97	7	9	1.16	1.43	96	7.3	7.6	9	53	0.53	0.78						
1-Jul-00	166	195	25	28	247	320	37	48	21,000	26,000	5	6	1	1	97	9	12	1.31	1.80	96	7.3	7.5	26	130	0.56	0.99						
1-Aug-00	159	215	23	31	175	238	25	34	20,000	26,000	5	6	1	1	97	9	12	1.28	1.80	95	7.3	7.4	7	19	0.66	1.07						
1-Sep-00	198	232	31	36	183	212	28	32	21,000	29,000	4	5	1	1	98	10	11	1.45	1.93	94	7.2	7.5	2	3	0.72	1.09						
1-Oct-00	162	175	27	32	150	158	25	29	23,000	31,000	4	6	1	1	98	9	12	1.52	2.10	94	7.3	7.6	15	50	0.55	0.86						
1-Nov-00	198	241	42	54	173	214	36	44	25,000	45,000	6	7	1	2	97	10	11	1.86	2.84	94	7.3	7.5	21	158	0.68	1.01						
1-Dec-00	241	262	40	42	200	226	33	36	24,000	30,000	5	5	1	1	98	8	9	1.30	1.43	96	7.3	7.5	2	5	0.62	1.27						
1-Jan-01	134	147	31	41	123	136	28	36	28,000	41,000	4	5	1	1	97	8	8	1.70	2.33	94	7.3	7.5	3	7	0.60	0.84						

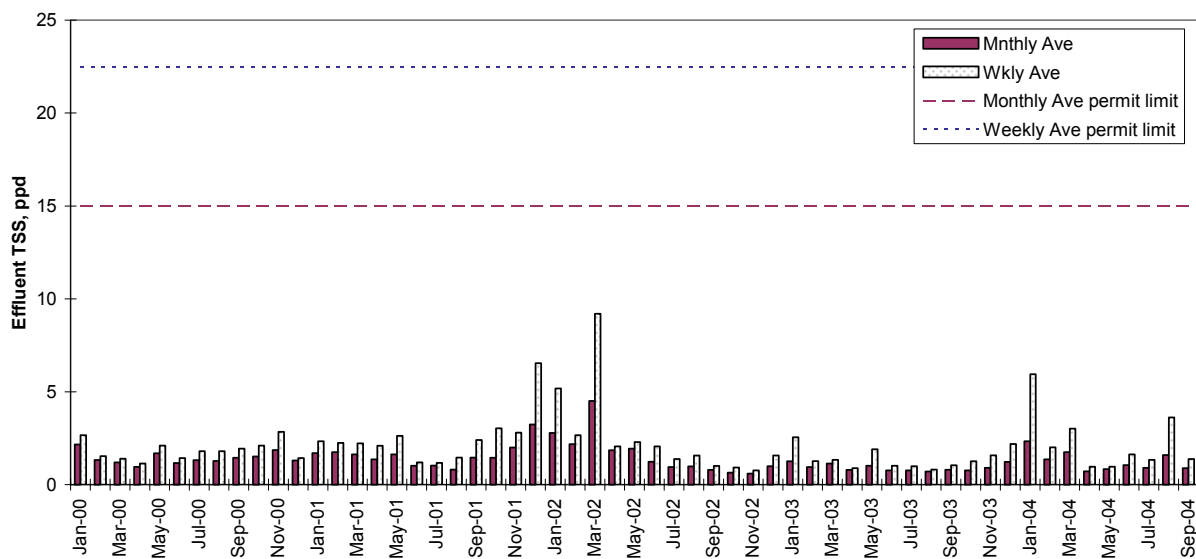
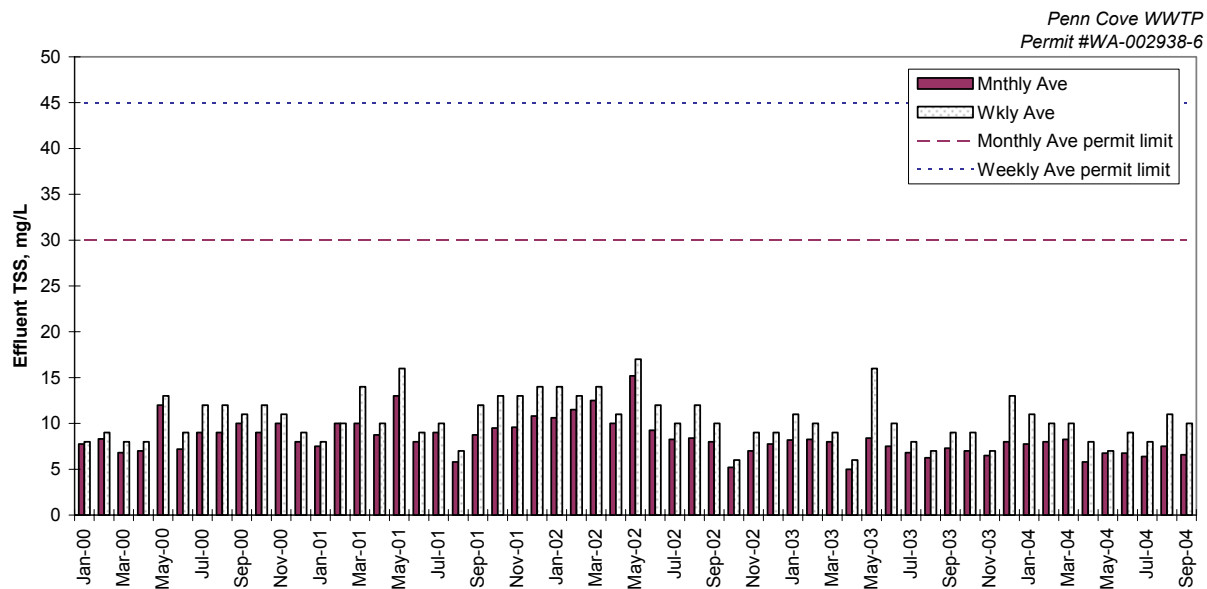
## APPENDIX F — DISCHARGE MONITORING DATA. 1997 – 2004 (CONT'D)



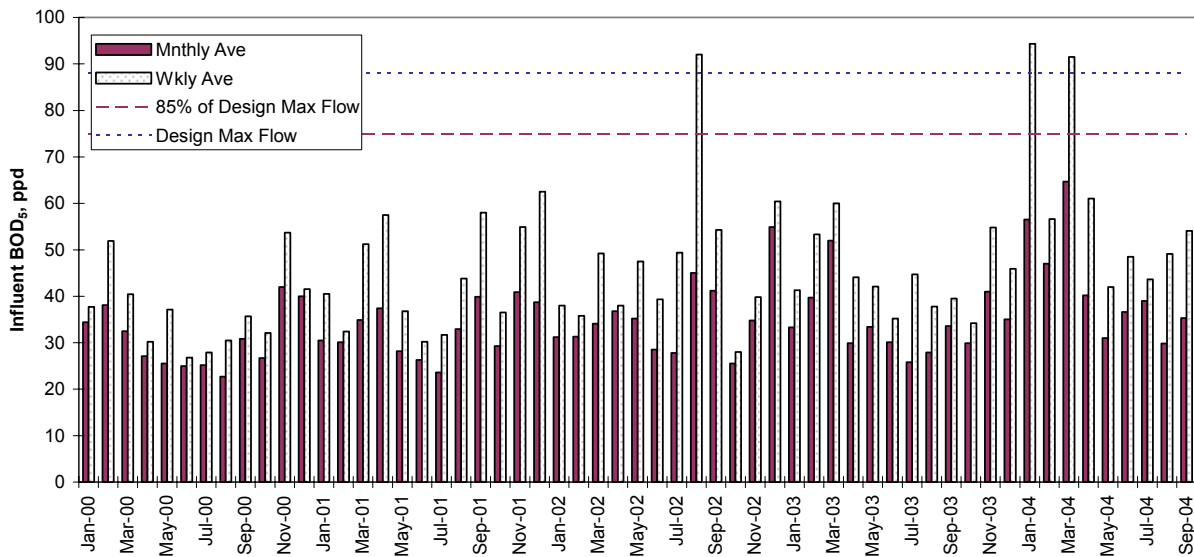
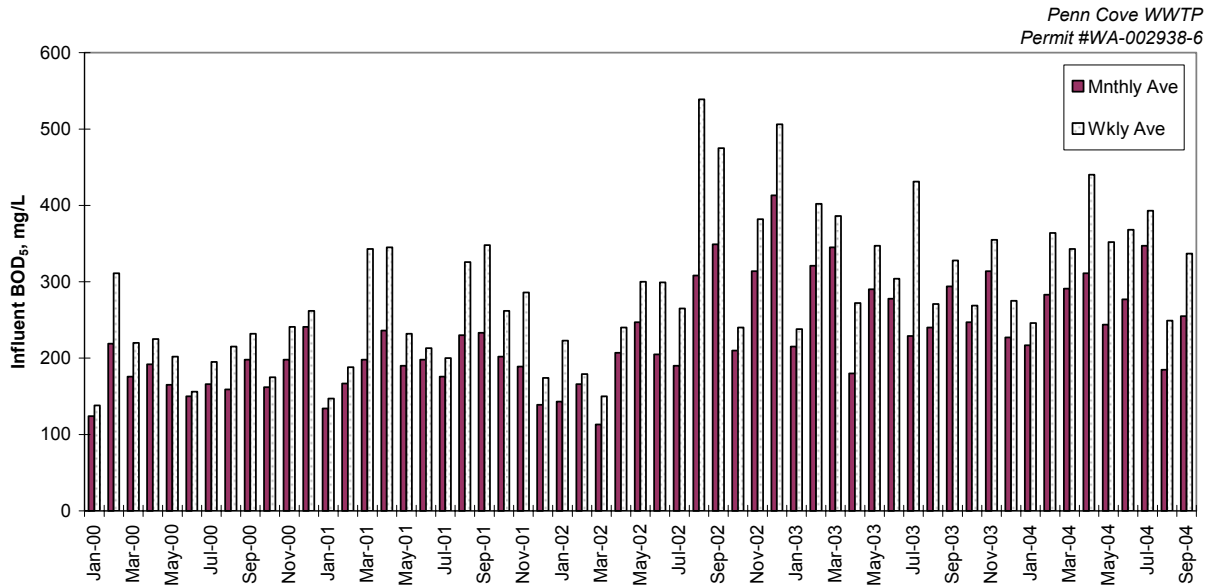
## APPENDIX F — DISCHARGE MONITORING DATA. 2000 – 2004 (CONT'D)



## APPENDIX F — DISCHARGE MONITORING DATA. 2000 – 2004 (CONT'D)

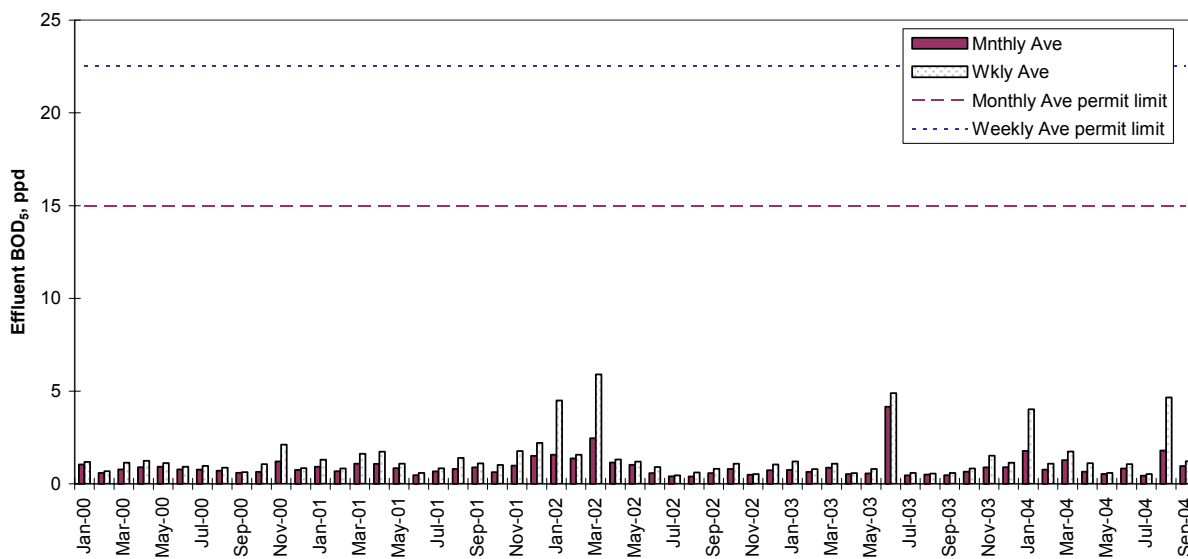
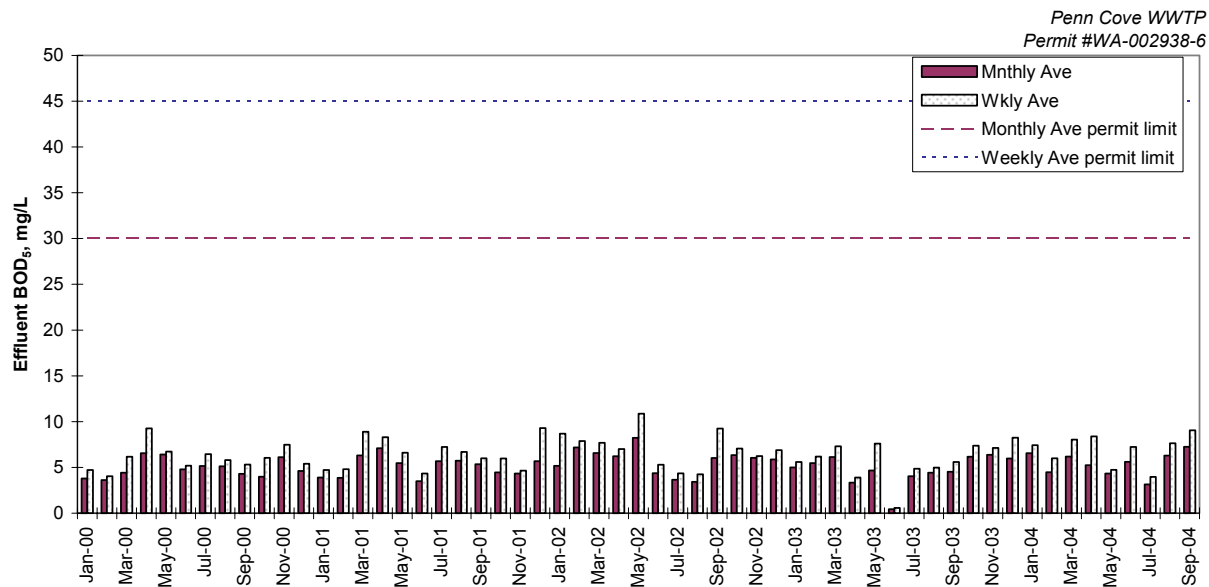


## APPENDIX F — DISCHARGE MONITORING DATA. 2000 – 2004 (CONT'D)

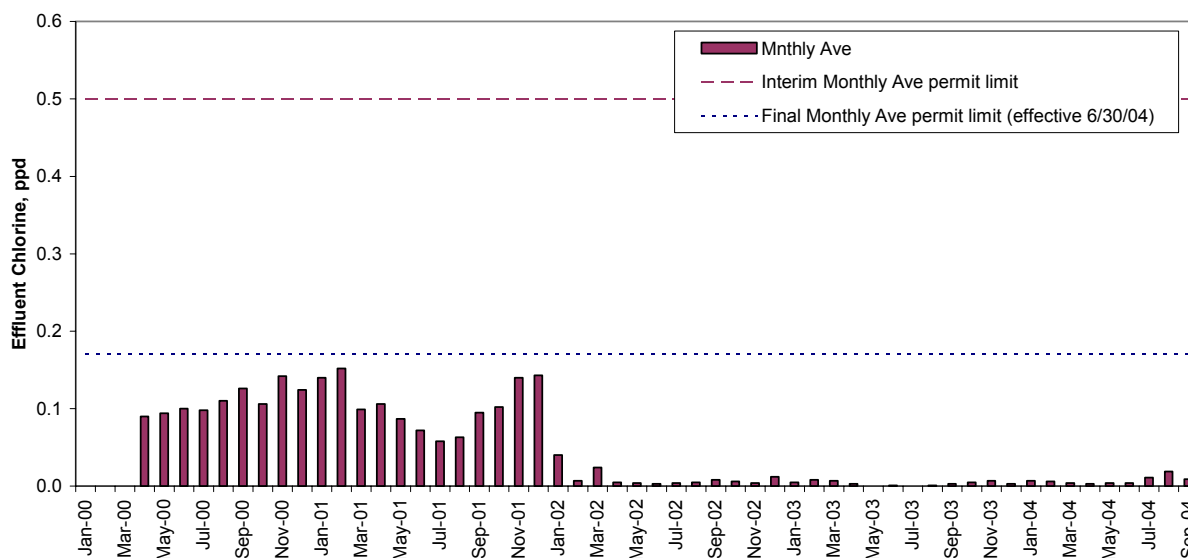
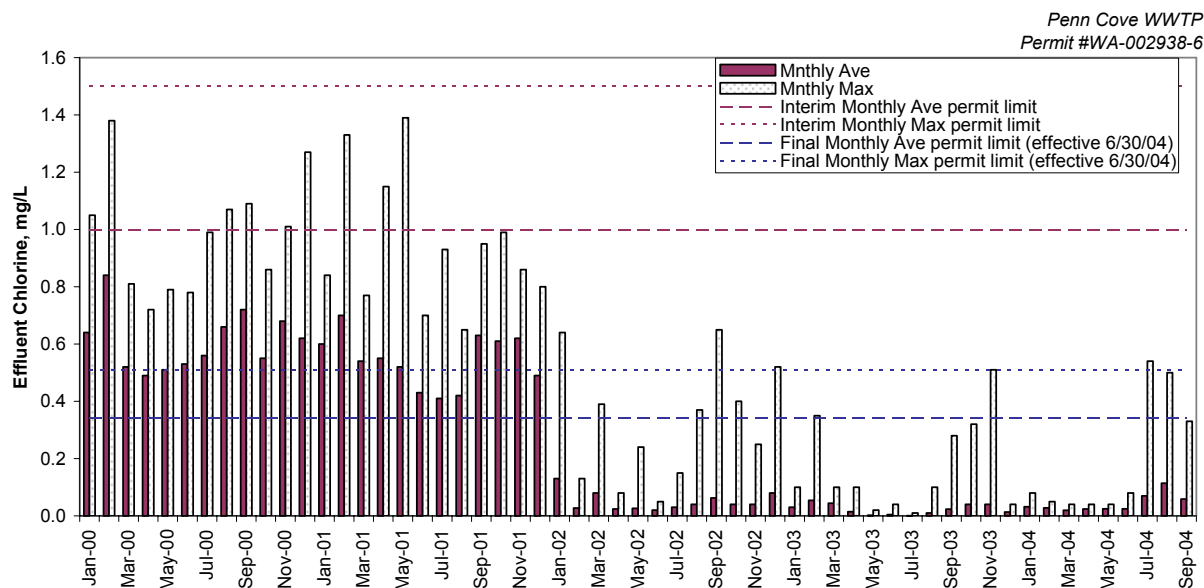




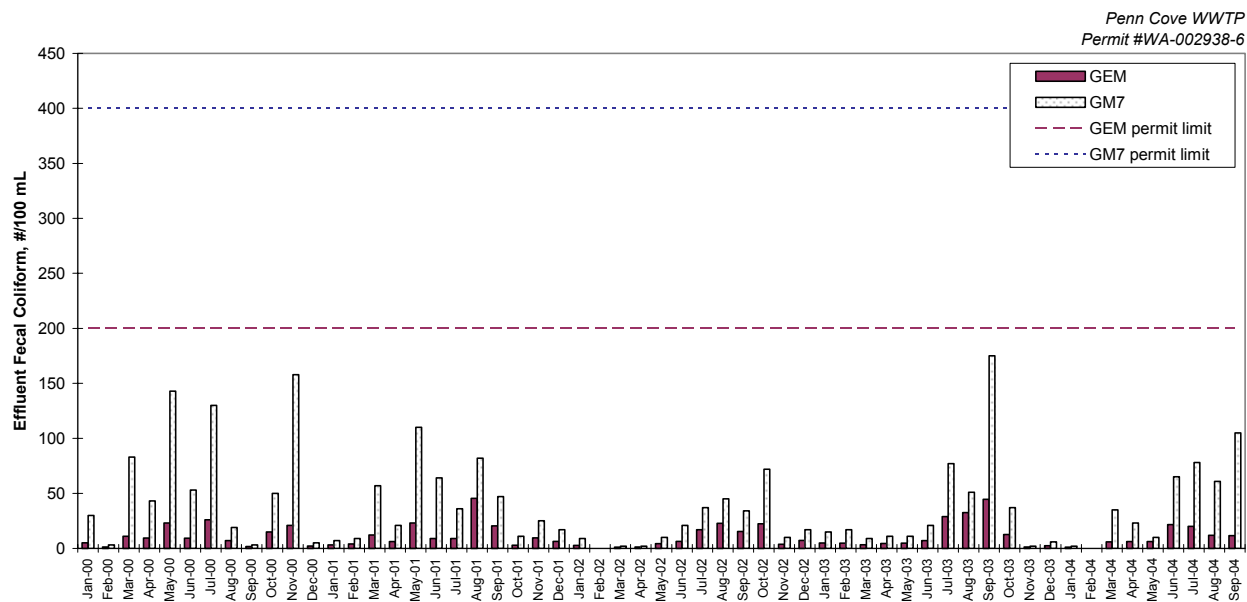
## APPENDIX F — DISCHARGE MONITORING DATA. 2000 – 2004 (CONT'D)



## APPENDIX F — DISCHARGE MONITORING DATA. 2000 – 2004 (CONT'D)



## APPENDIX F — DISCHARGE MONITORING DATA. 2000 – 2004 (CONT'D)



## APPENDIX G — CHLORINE LIMIT CALCULATION

Facility: Penn Cove WWTP  
Permit No: WA--002938-6  
Run Date: 3/15/2004

PARAMETER	<div> Dilution (Dil'n) factor is the inverse of the percent effluent concentration at the edge of the acute or chronic mixing zone. </div>					Permit Limit Calculation Summary					Waste Load Allocation (WLA) and Long Term Average (LTA) Calculations							Statistical variables for permit limit calculation			
	Acute Dil'n Factor	Chronic Dil'n Factor	Metal Criteria Translator	Metal Criteria Translator	Ambient Concentration	Water Quality Standard	Water Quality Standard	Average Monthly Limit	Average Monthly Limit	Max Daily Limit	WLA	WLA	LTA	LTA	LTA	LTA	LTA	Coeff. Var.	AML	MDL	# of Samples
			Acute	Chronic	ug/L	ug/L	ug/L	(AML)	(AML)	(MDL)	ug/L	ug/L	ug/L	ug/L	decimal	decimal	ug/L	decimal	decimal	decimal	per Month
Chlorine -Single Port Diffuser	74	258				13.00	7.50	336	0.17	509	962	1935	308.9	1021	0.60	0.99	308.9	0.23	0.95	0.99	20.00
Chlorine - 3 Port Diffuser	84	426				13.00	7.50	381	0.19	578	1092	3195	350.6	1685	0.60	0.99	350.6	0.23	0.95	0.99	20.00

This spreadsheet calculates water quality based permit limits based on the two value steady state model using the State Water Quality standards contained in WAC 173-201A. The procedure and calculations are done per the procedure in Technical Support Document for Water Quality-based Toxics Control, U.S. EPA, March, 1991 (EPA/505/2-90-001) on page 99. Last revision date 9/98.

fn: TSDCalc10.cls